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ANNUAL REPORT OF THE COMMISSIONERS OF THE DISTRICT OF COLUMBIA

YEAR ENDED JUNE 30, 1918

Vol. II

ENGINEER DEPARTMENT REPORTS

WASHINGTON
1918

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UNDER THE IMMEDIATE SUPERVISION OF THE ENGINEER COMMISSIONER.

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EXTRACT FROM REPORT OF THE COMMISSIONERS OF THE DISTRICT OF COLUMBIA FOR THE FISCAL YEAR ENDED JUNE 30, 1918.

OFFICE OF THE COMMISSIONERS
OF THE DISTRICT OF COLUMBIA,
Washington, October 1, 1918.

To the Senate and House of Representatives of the United States of America in Congress assembled:

The Commissioners of the District of Columbia herewith submit for the information of Congress, pursuant to the requirements of section 12 of an act providing a permanent form of government for the District of Columbia, approved June 11, 1878 (20 U. S. Stats., 108), a report of the official doings of that government for the fiscal year ended June 30, 1918.

* * * * * * *

ROADWAY PAVEMENTS.

The accompanying table shows the area, in square yards, of new roadway pavements laid and old roadway pavements resurfaced during the year, with the totals in square yards and miles of the various kinds of pavements at the close of the fiscal year.

Comparative statement showing character and extent of roadway pavements.

	Existing amount on June 30, 1917.		New pavement laid during the year (square yards).	Replaced with asphalt.	Existing amount on June 30, 1918.	
	Square yards.	Miles.			Square yards.	Miles.
Sheet asphalt and coal tar	3,064,706	162.66	93,051	.....	3,157,757	167.78
Asphalt block	603,261	30.59	22,961	.....	626,222	31.75
Durax block	12,294	.30	.....	.....	12,294	.30
Asphaltic or bituminous concrete:						
On concrete base	78,708	4.58	.....	.....	78,708	4.58
On broken stone base	51,088	2.68	.....	.....	51,088	2.68
Cement concrete	95,187	5.47	21,043	.....	116,230	6.71
Granite block and rubble	422,469	22.92	.....	16,434	406,035	22.03
Vitrified block	17,390	1.04	.....	.....	17,390	1.04
Cobble	66,766	3.16	.....	4,430	62,336	3.01
Macadam (estimated)	1,948,370	122.64	72,754	[1] 78,217	1,942,907	123.76
Gravel and unimproved (traveled)	.....	159.57	.....	.....	.....	153.49
Gutters on asphalt streets	219,440	.....	6,721	.....	226,161	.....
Gutters on asphaltic concrete streets	11,201	.....	.....	.....	11,201	.....
Pavements maintained by street railways	559,089	.....	4,224	.....	563,313	.....
Total	7,149,969	515.61	220,754	99,081	7,271,642	517.13

[1] Includes 11,318 square yards concrete pavement and 11,027 square yards asphalt block pavement.

NOTE.—50,414.70 square yards sheet asphalt pavement replaced, including 34,377.74 square yards asphalt surface laid on old base.

The sums appropriated for expenditures during the year under this head were as follows:

For paving new roadways and repairing old roadway pavements	$335,700
For construction and repair of suburban roads	94,500
For grading streets, alleys, and roads	25,000

The dominating condition that has characterized work during the year has been the scarcity and high cost of labor and material. In addition, the office and work force has been largely affected by reason of employees leaving the service to enter the military service. The work forces of the day labor gangs and the contractors' organizations have been reduced as a result of the unprecedented volume and urgency of activities related to the war which have been in progress in the District of Columbia. Due to these conditions, and especially to the fact that municipal work in the District of Columbia is limited by law to eight hours, while the governmental activities in connection with the war are not, the results of the working organizations of both the District and contractors of the District were curtailed to a considerable degree. At the end of the fiscal year much construction work was left undone and repair work was accomplished only with extreme difficulty and amounts limited to the bare necessities of traffic.

Notwithstanding these conditions, the work for which appropriations were made during the fiscal year is so far advanced that its completion during the present working season is anticipated. The single exception is the contract for constructing concrete roadways, amounting to about 75,000 square yards, which is now only about half completed.

The prices paid under contract for roadway pavements during the year were as follows:

	Per square yard.
Laying sheet-asphalt pavement (2½-inch asphalt surface, 2-inch binder, before compression) with 6-inch concrete base	$1.76
Laying vitrified block with 6-inch concrete base	1.70
Laying sheet-asphalt pavement (2½-inch asphalt surface, 2-inch binder, before compression) with 5-inch concrete base	1.69
Laying vitrified block with 5-inch concrete base	1.65
Laying 2-inch asphalt-block pavement on 6-inch concrete base	1.74
Laying 2-inch asphalt-block pavement on 5-inch concrete base	1.69

For the fiscal year 1919 bids were solicited for contract for street paving, but owing to war conditions no bids were received.

The current prices for resurfacing and repairing asphalt pavements under a one-year contract which expires June 30, 1919, are as follows:

	Per square yard.
Laying sheet asphalt pavement (2½-inch asphalt surface, 2-inch binder, before compression) with 6-inch concrete base	$2.89
Laying sheet asphalt surface (2½ inches before compression)	1.09
Laying asphalt binder (in connection with resurfacing work), per cubic foot	.43
Laying sheet asphalt surface for repairs, etc., within the space required by law to be kept in repair by street railway companies, per cubic foot	.75
Laying asphalt binder for repairs, etc., within the space required by law to be kept in repair by street railway companies, per cubic foot	.60

SUBURBAN STREETS AND ROADS.

The total of the appropriations for the construction of suburban roads and streets for the year was $415,400.

Work was continued during the fiscal year on improvements under contracts authorized in the fiscal year 1917. All of the work authorized for that year was complete except on the following streets:

Sixteenth Street NW., between Montague Street and Alaska Avenue: On this street heavy grading was completed, but no other work was undertaken on account of shortage of labor.

On Rhode Island Avenue NE., between South Dakota Avenue and the District line, the heavy grading was completed and macadamizing and guttering is in progress.

On Massachusetts Avenue, between Nebraska Avenue and the District line, heavy grading was completed and work on gutters and macadamizing is in progress.

The total amount of heavy grading done in 1917 projects completed during the year was 216,348 cubic yards.

On work authorized for the fiscal year 1918, contracts were entered into, but work has progressed with difficulty on account of the labor situation.

In repairs to suburban roads and maintenance of trunk lines of travel much work was done, but on account of the abnormal increase of traffic due to war activities in the District of Columbia, the suburban roads and streets were badly worn during the year and were kept in repair with difficulty. The customary force of laborers could not be maintained on account of the competition with contractors engaged on Federal Government work, although the rates of wages paid by the District for labor and teams was advanced about 80 per cent above prewar prices. The work also suffered on account of the difficulty of obtaining material by reason of embargoes and also the increased prices for materials. Due to these causes, efforts were concentrated on the upkeep of the main roads carrying heavy travel, and the minor streets and roads could receive but little attention. At the close of the year the main highways were passable, although in rough condition. The report of the superintendent of suburban roads gives in detail the various expenditures on various roads and streets.

MUNICIPAL ASPHALT PLANT.

The District of Columbia has operated a portable municipal plant in the repair of asphalt pavements and macadam streets for the past seven years. During the fiscal year 1918, the plant was operated for a period of 214 days, with a total output of 185,952 cubic yards of material, or an average of 869 cubic feet daily. This was an increase over the daily average output for the fiscal year 1917 of 132 cubic feet. Old material was used to a great extent in the manufacture of the output. Old asphalt topping removed from the streets in resurfacing is crushed into a finely broken product, to which new material is added. All details of the cost of operation of the plant are contained in the report of the engineer of highways. The cost of the product laid on the street is as follows:

Old material mixture per cubic foot	$0.4529
Asphaltic concrete mixture per cubic foot	.5232
Topping mixture per cubic foot	.5166

The total cost of minor repairs to sheet asphalt pavements during the year, representing the maintenance cost for the year, was

$51,493.07. This cost represents the maintenance of all asphalt streets not under guaranty by contractors—a total yardage of 3,064,706. The cost per square yard per year was about 1.7 cents. The like annual cost for previous years was as follows:

	Cents.		Cents.
1917	1.5	1912	2.4
1916	1.8	1911	2.2
1915	1.9	1910	2.6
1914	1.9	1909	2.3
1913	2.0	1908	3.8

The municipal asphalt plant began operations in the year 1912. Repairs were made by contract during the first quarter of that year and by the District, with the use of this plant, during the last three-quarters of the year. The work has been done by the plant continuously since that date. The marked reduction in the cost of repairs for the year 1917 was due to the fact that, by a law which became effective that year, repairs to asphalt pavements over one year old were charged to the repair appropriation instead of being done by paving contractors under a five-year guaranty. The yardage of pavement repair was thus increased by nearly 700,000 square yards, on which practically no expenditures were needed, as the pavements were only from one to five years old.

SIDEWALKS AND ALLEYS.

The sum of $220,000 was appropriated for paving sidewalks and alleys in all parts of the District, and the sum of $25,000 for laying sidewalks and setting curbs around Government reservations, Government buildings and parks. Sidewalks are paved with cement under contract and alleys are paved with vitrified block or asphalt block and cement concrete. Two thousand six hundred and eighty-one square yards of asphalt block, 4,055 square yards of vitrified block, and 13,037 square yards of cement concrete pavement were laid in alleys. One-half the cost of curb, sidewalk, and alley paving is assessed against abutting property, except that abutting public buildings and public reservations.

The contract price for laying sidewalks during the year was as follows:

For large jobs adjoining paved streets, per square yard	$1.53
For large jobs adjoining unpaved streets and for all small jobs, per square yard	1.71

No contract has yet been let for the fiscal year 1919.

The initiative in the matter of paving sidewalks and alleys is generally left with the owners of abutting property, the commissioners requiring a majority petition for such work before it is ordered. Exceptions are made, however, in cases where, on account of public danger or other public reason, the paving is demanded. The law requires the commissioners to advertise for two weeks their intention to lay sidewalks and curbs, and to pave alleys and to give a hearing to the property owners affected. The work is ordered subsequent to such hearing when, in the opinion of the commissioners, it is necessary for the public safety, health, comfort, and convenience. The demand for this class of construction is constant, and increased appropriations for this work could be advantageously expended.

BRIDGES.

The principal construction work done under the direction of the engineer of bridges during the year was the completion of the construction of a reinforced concrete viaduct in the line of Sixteenth Street, crossing Military Road, at a cost of $35,406.19; the construction of a reinforced concrete platform and wall at the east end of the M Street bridge over Rock Creek, at a cost of $9,015.57, and the construction of two concrete culverts in the line of Sixteenth Street between Southern Avenue and Clay Street NE., at a cost of $7,909.96.

Other important bridge work in progress is the construction of a culvert at the intersection of New York Avenue and Bladensburg Road, estimated to cost $4,000; the construction of the Benning viaduct, estimated to cost $186,420, and the reconstruction of the retaining wall on the south side of Canal Road.

Other minor work done was the repainting of the Chain Bridge across the Potomac and the Anacostia Bridge across the Eastern Branch, the reflooring of Connecticut Avenue Bridge across Klingle Road, which has been partially completed, and the construction of a culvert at Forty-first Street, south of Benning Road.

The engineer of bridges also prepared plans and specifications for a wharf on the Potomac River on Water Street, between M and N Streets SW., and bids were invited for the work. Due to war activities no proposals were received for the work and it is being held in abeyance until a later date. Plans and specifications were also prepared for a viaduct in the line of South Dakota Avenue NE., crossing the lines of the Baltimore & Ohio Railroad, but no proposals have yet been asked for this work, as condemnation proceedings are pending for certain land required for the approach.

The engineer of bridges recommends an appropriation of $193,000 for widening and strengthening the Calvert Street Bridge across Rock Creek.

SURVEYOR'S OFFICE.

The work done by the surveyor is of two classes, viz, that done for private parties and that done for the United States and the District of Columbia. For the work done for private parties, fees are charged in accordance with a schedule approved by the commissioners. The total amount collected for such work during the year was $9,565.15, as compared with $14,193.32 collected during the previous fiscal year. This decrease is due to the limited building operations resulting from war conditions and the high cost of labor and material. The number of lots surveyed was 2,576, as compared with 1,889 for the previous year.

For surveys made for the United States and the District of Columbia no fees are charged, but at the rate charged for private surveys the work done would have cost $5,970. Much of the work done for the Federal Government was in connection with war activities, such as surveys showing the distances of military camps and new tracts of land for governmental departments and new sites adjoining other Government departments to provide for their extension.

In condemnation cases difficulty has recently arisen as to the proper method to pursue after the jury determines damages and benefits.

Description of the land condemned and found benefited must be compiled and typewritten, and objection has been made to the jury securing help for this purpose on the ground that its findings should be secret until filed.

Such help should be furnished from the surveyor's office, an employee acting as confidential clerk to the jury; without this condemnation cases will be delayed and some may be set aside entirely.

A law to relieve this difficulty is recommended.

STREET AND ALLEY EXTENSIONS.

From the report of the surveyor of the District of Columbia it appears that during the past year 11 cases of condemnation of streets and alleys were confirmed by the court, and that there are now pending in court 20 such cases. The amount of damages awarded for land taken in these cases was $45,907.54. As the law requires that the total cost of condemnation of streets and alleys shall be assessed as benefits, this amount was covered by assessments. Among the important cases filed during the year but not yet disposed of by the court, there are included the opening, widening, and extension of Concord Avenue, Ingraham Street, Riggs Road, Kennedy Street, and Longfellow Street; the opening of Webster and Allison Streets between Arkansas Avenue and Fourteenth Street, and Arkansas Avenue between Thirteenth and Sixteenth Streets, and the extension of Fessenden Street between Reno and Belt Roads.

A table appended to the report of the surveyor gives the status of all condemnation cases instituted by the District of Columbia where the proceedings have been taken or completed during the year.

TREES AND PARKINGS.

The number of trees planted along the curbs in the streets of the District of Columbia at the close of the fiscal year was 104,617, a decrease under the preceding year of 262. The mileage of trees at the close of the year was 594.42, a decrease of 1.48 miles under the preceding year. The mileage of tree-planted streets, figured on the basis of 352 trees to the mile, at the end of the year was 297.21, a decrease of 74 under the preceding year. The amount expended for the planting and care of trees during the year was $62,746.60.

It has been the practice to transplant young trees from the nurseries to permanent positions on the streets as rapidly as the surface conditions justify the undertaking of such work and also to replace trees in vacant spaces caused by the removal of trees for various reasons. Due to the scarcity of labor this work could not be undertaken extensively during the year, and as a result there are many improved streets where trees have not been planted.

The tree nurseries located on Reservation No. 13, known as the Washington Asylum grounds, and at the intersection of Iowa Avenue and Webster Street NW., are well stocked with trees of all varieties considered best for street planting. No seedlings were transferred to the nursery rows in the Washington Asylum grounds and work of this character was confined to other nurseries. No systematic trimming of trees was undertaken during the year, but individual requests for such work were complied with. There is a great amount of trimming necessary at this time which it is impossible to undertake

extensively on account of the scarcity of skilled labor. The total number of trees trimmed during the year was 36,155.

STREET AND ALLEY CLEANING.

The operations of the street-cleaning division involve two distinct functions, viz, the disposal of waste material originating on public property commonly known as street cleaning, and the disposal of waste materials originating on private property commonly known as city wastes. Street cleaning is done by the District of Columbia directly, while city wastes are removed by contract.

The work of street cleaning has become more difficult and extensive owing to the large increase in population and traffic and the scarcity of labor. Due to this scarcity of labor the policy of increasing the area of streets cleaned by hand patrol could not be carried out. It was necessary to increase the area of street cleaning by machines and to reduce the area cleaned by hand. Owing to the inability to secure oil, the treatment of macadam and other suburban roadways with emulsified road oil for laying dust was discontinued, and it was necessary to revert to the old and less efficient method of laying dust by sprinkling with water. A comparison of the yardage cleaned during the year with that of the fiscal year 1917 indicates a decrease in all classes of work except motor flushing. The direct total costs and the unit costs per thousand square yards are all increased, but, owing to the increased population, the cost per capita per annum is less. This cost for 1918 was $1.443, as compared with $1.547 for 1917. The increase in unit costs, while partially due to the increased cost of materials and supplies, is mainly due to the increased cost of labor. At the beginning of the fiscal year the wages for laborers and drivers were $1.50 and $1.75, respectively. During the year these wages were increased to $2.50 and $2.75, respectively.

The following table shows the cost per 1,000 square yards of the various methods of street cleaning for the fiscal years 1914 to 1918, inclusive:

	1914	1915	1916	1917	1918
Hand patrol	$0.140	$0.132	$0.132	$0.145	$0.189
Machine sweeping	.156	.149	.144	.171	.239
Alley cleaning	.337	.331	.326	.371	.603
Squeegeeing	.121	.115	.106	.121	.168
Flushing	.232	.194	.212	.285	.450
Motor flushing					.314

The total cost of street cleaning, including all charges except interest on investment and depreciation, was $344,853.49. The population served, according to the police census of 1917, was 395,947, making a per capita cost of $0.871, as compared with a per capita cost of the preceding year of $0.831.

COLLECTION AND DISPOSAL OF CITY REFUSE.

Contracts for all classes of city wastes expired June 30, 1918, and bids were asked, to be opened July 2, 1917, for this work to begin July 1, 1918. The lowest bids for the collection and disposal of ashes, night soil, and dead animals were accepted. The proposals for collection and disposal of miscellaneous refuse were rejected on account of excessive prices. New bids were asked and were opened September 5, 1917. The bids for miscellaneous refuse were rejected

and the proposal for garbage disposal amounting to $143,400 was accepted. The successful bidder was the Washington Fertilizer Co. who had performed the work for a number of years. After acceptance this company notified the commissioners it would not enter into contract and forfeited its guaranty deposit of $3,000. Bids for garbage were again solicited and opened March 20, 1918. Only one bid was received, amounting to $184,800, and this bid was rejected as unreasonable. A request was then made to Congress for an appropriation to make possible the purchase of the plant of the Washington Fertilizer Co. in order that the District of Columbia might perform the work. On June 14, 1918, the commissioners entered into a contract with the Washington Fertilizer Co. to purchase its plant and equipment for the sum of $85,000. The plant is now the property of the District of Columbia and the collection and disposal of garbage is now being performed by the District.

Proposals for the collection and disposal of miscellaneous refuse were also opened on March 20 and contract entered into with John G. Faircloth under date of May 3, 1918, to perform this work for a period of three years from July 1, 1918.

The following table shows the unit cost of the collection and disposal of city refuse for the fiscal years 1914 to 1918, inclusive.

	1914	1915	1916	1917	1918
Garbage, per ton	$1.39	$1.34	$1.34	$1.56	$1.42
Ashes, per cubic yard	.29	.49	.51	.39	.54
Miscellaneous refuse, per cubic yard	.12	.11	.18	.19	.16
Night soil, per barrel	.96	1.16	1.17	1.33	1.33
Dead animals, each	.149	.14	.13	.12	.13

BUILDING OPERATIONS.

The estimated value of building construction, including repairs, during the year, but not including buildings under construction by the Federal Government, is $10,154,457, a decrease under the preceding year of $5,448,618.

The number of permits issued for buildings, building repairs, etc., was 3,906, a decrease of 1,676 under the preceding year. The total number of new buildings constructed was 956, a decrease under the preceding year of 479. Of these 529 were dwellings, a decrease of 292; 9 were apartment houses, a decrease of 35; and 419 business buildings, a decrease of 152 under the preceding year. The permits issued for repairs to buildings were 2,610, a decrease of 616 under the preceding year.

The distribution of the cost of these buildings, including repairs, are as follows:

	Buildings.	Repairs, etc.
Northeast	$120,835	$111,615
Southeast	150,950	45,380
Northwest	4,498,665	1,344,070
Southwest	4,100	29,025
County	3,396,165	445,182
Total	8,170,715	1,975,272
	1,975,272	
Sum total	[1] 10,154,987	

[1] Does not include awnings or signs, the values of which are estimated.

It is estimated that there are 65,401 brick buildings and 26,806 frame buildings in the District of Columbia. Of the brick buildings 813 were erected and 60 razed during the year and of the frame buildings 144 were erected and 47 razed.

It will be noted that there was a marked decrease in building operations which was due to the war, the scarcity and high cost of labor, and the great advance in the price of materials as well as the difficulty in their delivery. Permits for buildings are issued upon the payment of fees which are designed to cover the cost of the operation of the building inspector's office. Due to the falling off in building, however, the approximate difference between the expenses of the office and the receipts for fees was $10,000 for the year.

CONSTRUCTION OF MUNICIPAL BUILDINGS.

During the year 10 buildings were under construction as follows:

Building.	Location.
Fish Wharf and Market	Water Street, between Eleventh and Twelfth Streets SW.
Central garage	D Street, between Thirteenth and Thirteen-and-a-half Streets NW.
Elizabeth V. Brown School, No. 113	Connecticut Avenue between McKinley and Northampton Streets NW.
Sheds for street-cleaning department	Between Thirteenth, Fourteenth, E, and G Streets SE.
Greenhouse for James Ormond Wilson Normal School, No. 162.	Eleventh and Harvard Streets NW.
Garage for health department pound and stable.	South Capitol and I Streets NW.
Farmers' Produce Market, third shelter	B between Tenth and Twelfth Streets NW.
Foundry addition to McKinley Manual Training School, No. 130.	Seventh Street and Rhode Island Avenue NW.
Woodburn School, No. 101, addition for toilets.	Riggs and Blair Roads, Woodburn.
Benning School, No. 48, addition for toilets	Anacostia Road, between Benning Road and F Street NE.

Plans and specifications for all buildings for which appropriations have been made were completed with the exception of the Eastern High School and the Woodridge and Langdon Schools. The site for the Eastern High School has been secured and preliminary plans for the building have been drawn and are under consideration.

Owing to war conditions, no appropraitions were made for new school buildings or additions to existing school buildings for the next fiscal year. In lieu thereof, $150,000 was appropriated for the construction of portable school buildings to take care of the increase in the school population. As the appropriation for these portable buildings was not available until September 1, it was impossible to construct them in time to be of use during the school term beginning in September.

Owing to the difficulty of obtaining bids for building construction, it was necessary to undertake such work as was urgent by employing day labor and purchasing materials, but even this expedient seems likely to fail in the future on account of the scarcity of labor and the difficulty of obtaining essential building materials.

REPAIRS TO MUNICIPAL BUILDINGS.

All municipal buildings are kept in repair under the direction of the municipal architect. These include school buildings, engine houses, police stations, and the police-court building. They number about 300 in all. The cost of repairs was much increased during

the year, due to increases made in the wages of mechanics and laborers, and increase in the cost of material.

In the report of the municipal architect will be found a memorandum on the subject of classroom ventilation, prepared by the sanitary engineer of his department, which merits special attention, as change in ventilation systems with expensive alterations attendant is urged with warm pleading. The ventilation of schoolrooms throughout the United States calls for large expenditure for heating apparatus, and what with some systems seems a waste of fuel. The importance of the subject of heating and ventilating plants in public schools would justify its study by a commission such as is recommended by the municipal architect in his report.

THE DISTRICT BUILDING.

The routine work incident to the care of the District Building involves several distinct functions, viz, the power plant; woodworking, paint, and electrical shops; blue prints and photo shop; printing shop; and the elevator, watch, and cleaning forces. During the year 2,313 tons of coal were consumed, an increase of 453 tons over the preceding year. Electric current generated and consumed amounted to 462,900 kilowatt hours, of which 317,640 kilowatt hours were used for lighting and 145,260 for power. Of the latter 30,460 kilowatt hours were consumed by the fire-alarm apparatus, the laboratories of the health department and the inspector of asphalt and cements. Nine hundred and sixty-seven orders for blue prints were completed, at a cost of $980.84, and 153 orders for photographs were executed at a cost of $600.32. Five hundred and fifty-one orders for printing were executed at a cost of $5,753.40. Waste paper amounting to 60,745 pounds was baled and delivered to the contractor. The regular appropriation for the care of the building was $17,000 and a deficiency appropriation of $10,000 was made primarily for the purchase of coal.

STABLES.

The stables located at First and Canal Streets SW. are used by the disbursing officer, plumbing inspector, sewer department, part of the surface division, surveyor, and department of weights, measures and markets; those at U Street, between Sixteenth and Seventeenth NW., by the municipal architect, repair shop, part of surface division, and the engineer commissioner and assistants. The employees at these stables include 1 blacksmith, 1 driver, and 3 watchmen, on the annual roll, and 65 drivers, 3 stablemen, and 1 watchman on the per diem roll. These stables accommodate 53 horses and 43 mules. The average cost of the forage for a horse for a year was $197.04. It is very desirable that the First Street stables should be removed from this location so near the Capitol, but measures to this end are not now recommended, as other demands are more imperative.

CENTRAL GARAGE.

The central garage was placed in operation January 1, 1918, and all passenger vehicles maintained under the contingent appropriation for the operation, care, and maintenance of motor vehicles were assigned to this garage for general use under the direction of the commissioners.

WORKHOUSE AND REFORMATORY.

During the past year the engineering and construction work at the workhouse and reformatory located at Occoquan, Va., has been conducted under unusual difficulties. Owing to the passage of the prohibition law the population at these institutions was reduced and a few men from building trades were among the prisoners who could be used on the work. Skilled labor was difficult to obtain on account of the competition with military construction work at Camp Humphreys, Va., a few miles away. For these reasons, work which should have been completed in six months has taken over a year. Attention is invited to the report of the construction engineer showing the cost of the several buildings and other work undertaken during the year. The frame buildings which were erected in 1907 and 1908 were intended as temporary structures and while they serve a good purpose for short-term men, they are inadequate and poorly adapted for long-term men. The municipal architect, under whom the construction work is placed, recommends that the present frame buildings be encased in brick walls as soon as practicable, thereby permitting the use of the present structures until more permanent and comfortable buildings are completed.

PLUMBING AND PLUMBING INSPECTION.

During the year the plumbing office made 25,995 inspections compared with 35,189 during the preceding year. It is estimated that the total cost of new plumbing work installed in private buildings was $755,215 and of repairs and remodeling work, $301,415. The average number of inspections per day per man, field-inspection force, was $8\frac{1}{3}$, and the greatest number in any one day by any one man was 35.

Under the compulsory drainage act, 24 cases were forwarded by the health department and other branches of the District government for the installation of sewer and water in those instances where the owner had failed to do the work after notice served upon him. In 9 of these cases the work was done by the owner or agent, in 9 of them the work was done by the District of Columbia and the cost assessed against the property, and there are 19 cases pending. In five of these further action is suspended, as the buildings are not now occupied.

PLUMBING BOARD.

During the year the plumbing board held 24 sessions for the examination of candidates for license as master plumber and gas fitter. The total number examined was 17. The number of original candidates examined for license for master plumber and gas fitter was four, none of whom passed. Of the 13 who had been previously examined for license, one passed and 12 failed.

INSPECTION OF STEAM BOILERS.

The number of steam boilers inspected by the inspector of steam boilers during the year was 480, including 27 for the District of Columbia. Three boilers were condemned as unfit for further use. The compensation of this official is received from fees paid by the owners of the boilers. The total amount of fees reported by him during the year was $2,265, and the expenses of inspection $330, leaving a net compensation to him of $1,935.

EXAMINATION OF STEAM ENGINEERS.

The board of examiners of steam engineers held 55 examinations and examined 134 applicants, of whom 44 were found competent and 90 not. The board also conducted examinations of applicants for permits of operators of automobiles and motorcycles.

PUBLIC CONVENIENCE STATIONS.

The four public convenience stations located at Seventh Street and Pennsylvania Avenue, Thirteen-and-a-Half Street and Pennsylvania Avenue and Ninth and K Streets NW., and Fifteenth and H Streets NE. were operated during the year from 6 a. m. to midnight with two shifts of attendants, each working nine hours per day. The receipts from pay compartments amounted to $5,722.96. Plans for a fifth station at Eighth and F Streets NW. are in preparation and locations for other stations are under consideration.

STREET LIGHTING.

There are 19,506 street lamps of all kinds in the District of Columbia, as follows:

Mantle gas	10,417
Electric arc:	
6.6-ampere magnetite	280
4-ampere magnetite	517
Electric incandescent:	
250-candlepower, series	10
100-candlepower, series	3,699
100-candlepower, multiple	98
60-candlepower, series	3,588
60-candlepower, multiple	321
4-glower Nernst	64
Street-designation lamps:	
Gas	393
Electric	119
Total	19,506

This was a net increase during the year of 266 lamps.

The improved incandescent electric lighting was extended during the year in New York Avenue, E, F, G, Eighteenth, and Nineteenth Streets NW. in the vicinity of the new Federal Government buildings in this locality; also in Virginia Avenue, C, D, E, Eighteenth, Nineteenth, and Twentieth Streets NW. in the vicinity of the new temporary Government buildings in this locality.

LIGHTS ALONG STEAM RAILROADS.

The situation with respect to the several suits brought by the District of Columbia against steam railroad companies to compel repayment for the sums expended by the District on maintaining lights along the respective rights of way of such companies is essentially as reported last year. The litigation has persisted for many years, and suits in sums aggregating upward of $38,000 are now before the courts and grounds for further suits continue to accumulate. So far the outcome has been favorable to the District.

FIRE ALARM, TELEPHONE, AND TELEGRAPH SERVICE.

There were in service on June 30, 1918, 155.188 miles of cable, containing 6,203.335 miles of conductor. The aerial cable service at the end of the year was about 5 miles, containing 164.77 miles of conductor. There were 1,316 telephones connected to the District system at the end of the year. There were 637 fire-alarm boxes in service at the end of the year, an increase of 33 over the preceding year; 678 box fire alarms and 957 local alarms were received during the year, of which 88 box and 22 local were false. At the end of the year there were 17,936 line and 948 guy poles of all kinds in the District of Columbia.

The total number of electrical inspections made during the year was 10,058. The total amount of fees paid for permits was $5,203.07.

PARKS.

During the past year the following small park was acquired under the appropriation available for the purpose, viz, square 1726, bounded by Nebraska Avenue, Van Ness and Forty-first Streets. Plans are in preparation to acquire land in square 1483, west of 1556, north of 3376 and 3340 for park purposes, but the petitions for their condemnation have not yet been filed in the court.

During the past year the matter of acquiring larger parks has not been given much attention on account of pressing governmental activities in other matters, but further parks are necessary to promote the health and happiness of the residents of the District of Columbia as well as to enhance the beauty of Washington.

Of the various larger areas of desirable acquisition that known as the Klingle Valley tract especially commends itself. Its purchase has been urged by successive boards of commissioners for at least seven years in one form or another. Its natural beauty appeals to those going through it, and it would aid access to Rock Creek Park, independent of Zoological Park control, from Woodley, Klingle, and Reno Roads. The area which should be acquired is not great and will not interfere with the development of adjacent areas.

ROCK CREEK PARK.

During the fiscal year Rock Creek Park was under the jurisdiction of the board of control of Rock Creek Park, consisting of the Commissioners of the District of Columbia and Chief of Engineers, United States Army, acting jointly. The appropriation for care and maintenance was $22,000, of which sum approximately $13,000 was expended for labor and material, and a balance of approximately $9,000 remaimed unexpended. On account of the difficulty in obtaining labor and materials no large item of new construction was undertaken during the year.

By an act of Congress, approved July 1, 1918, the jurisdiction and control of this park was taken from the board of control of Rock Creek Park, as above indicated, and given to the Chief of Engineers, United States Army. As the board will, therefore, have no further control over the park, it would seem apropos to briefly state what has been done during the 19 years that it has been under the control of the board.

During the time since this park was created, there have been built about 9.2 miles of macadamized park roadways from 18 to 24 feet wide, in addition to the reconstruction of 1.9 miles of county roads passing through the park, nearly all involving heavy grading; about 20 miles of bridle paths, and about 6 miles of foot paths. One large permanent stone bridge (Bowlder Bridge) and one temporary girder bridge, at the north end of the park, have been built across Rock Creek, and five masonry bridges or viaducts have been built across smaller streams, besides numerous masonry culverts. The dam at Pierce Mill was constructed of bowlders.

A considerable area of the park near the roads has been cleared, and the portion opened has been maintained in suitable condition for use by constant attention. This work has all been done from the annual appropriations, which have amounted to $333,333.98 in 19 years, or about $17,300 per year. As the annual cost of maintenance alone has been from $10,000 to $12,000, it appears that the work so far accomplished has been done at a low cost when the original condition is taken into consideration.

HARBOR FRONT.

The total amount received from the rental of wharves and river frontage placed by law under the direction of the commissioners was as follows:

Potomac River front	$16,321.60
Anacostia River front	322.59
Total	16,644.10

The actual water frontage in the District of Columbia devoted to commerce, with the exception of canals, is about 2 miles. The total available water frontage is about 18 miles, of which about 8 miles is set aside for parks and purposes of the United States. The largest amount of wharf property under the control of the commissioners is along the Washington Channel. The total frontage along this channel is 9,275 linear feet, of which 4,675 linear feet, between the grounds of the War College and the south curb line of N Street, are under the control of the United States. Of the remaining 4,600 linear feet, 4,021 linear feet are under the jurisdiction of the commissioners and 559 linear feet, between Thirteenth and Fourteenth Streets, has been designated by Congress as the site of the Federal central heat, light, and power plant.

Along the frontage under the control of the commissioners are located the harbor police station and dock of the harbor boathouse and dock of the fire boat, the District morgue, the municipal fish wharves and market, and a District property yard. The balance of the frontage is leased to private parties.

CONDEMNATION OF INSANITARY BUILDINGS.

The board for the condemnation of insanitary buildings held 11 meetings, and issued orders for the demolition of 96 buildings and the repair of 42 buildings. Of the buildings ordered to be demolished, 52 were located on streets and 15 on alleys. Of those ordered to be repaired, 39 were on streets and 3 on alleys.

Since the creation of the board, May 1, 1906, it has examined 6,958 buildings, of which 2,149 were demolished and 1,634 repaired. Of the buildings demolished, 1,458 were located on streets and 691 on alleys. Of the buildings repaired, 1,111 were on streets and 523 on alleys.

The estimated number of tenants required to secure other quarters through the action of the board in the demolition of buildings since the creation of the board is 6,172. The number of tenants benefited by repairs to buildings required to be repaired by the board is 5,466.

Minor repairs have been made to a number of buildings, both in alleys and streets, through informal requests of the board by many owners and agents without the necessity of serving formal notice upon them.

The act of Congress approved September 25, 1914, declaring the use or occupation of any building or other structures erected or placed on or along any alley as a dwelling or residence or place of abode by any person or persons is injurious to life, to public health, morals, safety, and welfare of the District of Columbia, and such use or occupation of any such building or other structure on, from, and after the 1st day of July, 1918, shall be unlawful, was amended by an act of Congress approved May 23, 1918, which amendment provides "that the operation of the second paragraph of section 1 (relating to the use or occupation of alley buildings as dwellings) in the same hereby is postponed until the expiration of one year following the date of the proclamation by the President of the exchange of the ratifications of the treaty of peace between the United States and the Imperial German Government."

SEWERS.

The construction and maintenance of the sewer system and the sewage disposal system of the District of Columbia is placed under a division formerly designated the sewer division. In the last District appropriation the title of the head of this division was changed from the superintendent of sewers to sanitary engineer.

The length of main and pipe sewers constructed during the year was 13.47 miles. The total length of main and pipe sewers on June 30, 1918, was 730.84 miles, of which 144.97 miles are main sewers and 585.87 miles are pipe sewers. There was expended during the year on the sewer system the sum of $379,206.24 and on the sewage disposal system $35,159.21. The total cost of the sewerage system to June 30, 1918, was $13,949,036.45. The cost of the sewage disposal system to the same date was $4,720,324.92, making a total cost of the complete system to June 30, 1918, $18,669,361.37.

SEWER CONSTRUCTION.

The following table shows the length and cost of sewers constructed during the year:

Section.	Length.	Cost.
	Feet.	
1. County west of Rock Creek	15,268.90	$114,750.93
2. County east of Rock Creek	23,072.80	110,078.71
3. County west of Anacostia River	4,892.10	11,218.03
4. County east of Anacostia River	22,856.77	74,999.32
5. Washington City	7,650.65	68,159.25

In the informing report of the sanitary engineer will be found details of comprehensive drainage studies and continued consideration of river conditions as affected by sewage discharge. While the conditions of river waters at and below outfalls was generally very good, and throughout the year fair, yet they indicate the need in the future of the installation of sewage treatment works. The design of such works is under study.

Extracts from his report, relating to the sewage disposal system and the Metropolitan sewage district, follow:

SEWAGE DISPOSAL SYSTEM.

The main sewage pumping station was in continuous operation throughout the year, handling the sewage of practically the entire District and also the storm water from the 900-acre low area within the dike lines. At the main pumping station sewage to the amount of 23,675,000,000 gallons and 978,522,000 gallons of storm water were pumped during the year, an increase of 1,800,000,000 gallons of sewage over the amount pumped the previous fiscal year. At the Poplar Point pumping station 577,800,000 gallons of sewage were pumped, an increase of 125,000,000 over the quantity pumped during the previous fiscal year. At the Woodridge pumping station sewage to the amount of 6,432,700 gallons were pumped during the year.

The main sewage outfalls of the disposal system at Grimes, on the Potomac River, were under observation throughout the year, and the river conditions in the vicinity were given careful study. The condition of river waters at and below the outfalls was generally very good and throughout the year was fair. No evidences of sludge depositing were disclosed, the beaches in the vicinity of the outfalls were quite clean, and the river surface at all times substantially free from the objectionable sleek of oil or grease as well as floating matter. Yet in all of these respects conditions were progressively less favorable than in previous years, and in other important particulars the deterioration was somewhat more apparent, particularly in the drop in oxygen content, which is recorded elsewhere, and in the presence at times of noticeable and objectionable odors. These conditions indicate the need in the near future of the installation of sewage-treatment works. The first step in this direction is the acquiring of suitable land for these works, and very considerable time has been given to the physical study of areas available, their mapping and platting, so that prompt action could be taken under the authority granted by Congress in the appropriation act for the fiscal year 1919, which provides for the purchase of lands for this purpose. In laying down the principles which will govern the design of these sewage-treatment works, it should not be considered necessary to install works which will secure a high degree of sewage purification, as this would involve an extraordinary expenditure, both for construction and operation, not justified by the local conditions. It is proposed first to establish a reasonable constant as to the amount of organic matter which will be made dependent on the river waters for purification and then to remove the excess beyond this constant by means of these artificial works. The natural conditions which permit the effective disposal of a very large volume of sewage are unusually favorable, as shown by the recent elaborate and

thorough investigation of the United States Public Health Service (see Report No. 104, U. S. Public Health Service), and these should be supplemented to the extent necessary to maintain this constant (i. e., the total volume of organic matter dependent on the river waters for purification), probably at somewhat less than the load carried by the river during the fiscal year 1914, when conditions in all respects were highly satisfactory.

METROPOLITAN SEWERAGE DISTRICT.

War conditions have prevented the beginning of construction on the systems of sewerage and interceptors on the Maryland areas contiguous to the District which have been designed with a view of removing the sewage from neighboring Maryland towns, now seriously polluting the several streams flowing into the District, which are not only such important features of the park system, but traverse closely built-up sections of the city itself, with their contaminated waters at the doors of hundreds of dwellings. Much, however, has been accomplished in the way of planning and organization, and it is felt that a secure foundation has been laid for the realization of this important cooperative plan for sanitary betterment between the District of Columbia and the State of Maryland, which was originally advised in the annual report of the superintendent of sewers for the fiscal year 1909, from which the following is abstracted:

> The only practical solution of this problem is believed to be in the formation of a metropolitan district under the control of a State and national board, with power to construct the necessary valley interceptors for the removal of the sewage, and that these interceptors be arranged so as to discharge at the State line into the interceptors of the sewage-disposal system of the District of Columbia, the District to be reimbursed for the cost of pumping and handling the sewage from the Maryland towns and villages by a State-collected tax levied upon the communities benefited, which would also defray the cost of construction and maintenance of the State system.
>
> The present conditions are not such as to render this a matter of immediate urgency, but the population in these areas is quite rapidly increasing, so that for a subject so complicated, especially in the matter of jurisdiction and legislation, which will require a number of years to develop, it is believed not too soon to begin the study of the problem. The interests of the District are so immediate and the conservation of the purity of these streams so important for the protection of the park systems and in the interest of the public health and sanitation, that it is respectfully recommended that a board be appointed to work in conjunction with such officials of the State of Maryland as may be designated for tentative consideration of the subject as soon as the necessary authority be obtained.

The condition of the streams where they enter the District of Columbia has been under observation throughout the year, and the increase in their pollution by bacteriological determinations has been appreciable. These undesirable conditions are becoming more apparent on account of recent construction of sewerage systems in the bordering Maryland towns where sewage is discharged directly into these streams.

WATER MAINS.

During the year 27,735 feet, or 5.2 miles, of water mains of various sizes were laid, making a total length of mains now in the service of 3,298,891 feet, or 624.8 miles. The aggregate cost of the water-distribution system to June 30, 1918, was $3,951,579.41. There were in service at the end of the year 3,548 fire hydrants, 227 public hydrants, 17 sanitary fountains, 156 horse fountains, 42 deep public wells, and 4 shallow public wells.

WATER CONSUMPTION AND WASTE.

The per capita consumption of filtered Potomac water can not be given owing to the lack of information as to the present population of the District of Columbia, which has been largely augmented during the year on account of the influx of people due to the war. The total mean daily consumption for the year was 59,606,970 gallons as compared with 51,454,000 gallons for the preceding year. This increase of practically 8,000,000 gallons per day is mainly owing to the increase in population, but to some extent is due to the large quantities of use and waste of water by the Federal Government and the District of Columbia. It is believed that the present water supply is ample for a population of 500,000 people if properly conserved, and this conservation can only be accomplished when all consumers, including the United States and the District of Columbia, pay for the water used. Neither the United States or the District of Columbia is now charged for water used, and the only method of arriving at a proper charge would be by a valuation of the water supply and distribution systems and the charging of a proper rate based upon a fair return on the investment.

The cost of operating the pumping engines at the District pumping station was $74,172.88. The total pumpage for the year was 10,648,160,000 gallons and the average daily amount pumped was 29,173,041 gallons. The amount of coal burned was 6,682.65 tons.

The underground leakage of water detected and prevented during the year was at the rate of 834,640 gallons per day with an average waste per leak of 5,717 gallons per day. The principal cause of leakage was found in corroded iron services and a large number of calked joints were found defective, indicating a severe leakage from this source. Most of the joint leaks were found in the old 6-inch mains and but few were found in mains recently installed where sufficient calking was used. The cost of this leak investigation was $19,345.81 and the results based on the sale price of water at 4 cents per hundred cubic feet represents an 80 per cent return upon the investment.

WATER REVENUES AND EXPENDITURES.

The revenues from all sources during the year, including a balance of $181,354.55 brought forward, amounted to $978,948.49. The expenditures of the distribution system amounted to $590,567.76. Advances made on account of the Washington Aqueduct or supply system amount to $188,600. The balance, including $192,098.14 in the Treasury of the United States, $308.67 in the hands of the collector of taxes of the District of Columbia, and $7,373.92 in the hands of the disbursing officer of the District of Columbia, is $199,780.73. This balance is obligated to the extent of $164,625.83, leaving an unobligated balance under date of June 30, 1918, of $35,154.90. Of the total cost of the work during the year, 36.6 per cent was for new work, 46.3 per cent for operating expenses, 15.7 per cent for general repairs, and 1.4 per cent for replacement.

WATER METERS.

During the fiscal year only 986 water meters have been installed, making a total number in use on June 30, 1918, of 61,107. The average cost of installing a meter in a private residence where the work is done by the District is $15.76, made up as follows: Cost of meter, $6.38; material, $5.63; labor, $3.75. The average cost per meter for maintenance is 24 cents. The rate charged for water on metered services is 4 cents per hundred cubic feet for all used in excess of 7,500 cubic feet. The minimum charge to each premise, allowing the use of 7,500 cubic feet, is $4.50 per annum. On unmetered services the rate for domestic purposes is charged according to stories and front feet. On all houses two stories high with a frontage of 16 feet or less the charge is $5 per annum, and for each additional front foot or fraction thereof there is added 31 cents to the charges as computed above. For each additional story there is added one-third of the charges as computed above. For business premises not metered the rates vary from $1 to $25 per annum. Where the rate is $25 or more a meter is required to be installed by the owner or occupant of the premises at his own expense. The amount of water rents collected under the flat rate system was $73,888.97 and under the meter system $637,695.98. For water used in building construction the amount collected was $2,803.33, making a total of $714,388.28. In addition to this amount, the water revenues from other sources such as water main tax, charges for taps, etc., brought the total receipts up to $797,593.94. The estimated receipts for the fiscal year 1920 are $733,500. The total number of water services at the end of the fiscal year was 70,935, of which 61,107 are metered and 9,828 not metered, making a percentage of services metered 86.

ANACOSTIA RIVER AND FLATS.

The total expenditures to the end of the fiscal year on the project for the reclamation and improvement of the Anacostia River and Flats from the Anacostia Bridge to the District line, as reported by the Secretary of War, under whose direction this work is being prosecuted, amounts to $753,874.18, of which there was expended during the fiscal year 1918 $172,090.37. No appropriation was made for this project for the fiscal year 1918. The amount expended at the end of the year was $246,125.82, and the amount obligated $28,000. The amount estimated for the fiscal year 1919 is $218,-125.82. The project was 24 per cent completed on June 30, 1918.

The work during the year resulted in the dredging of 391,717 cubic yards of material in Sections D and E, at a cost of $26,739.60; the excavation and placement of 151,398 cubic yards for 35,961 feet of embankment in Section F, at a cost of $5,671.16; the placement of 13,805 cubic yards of riprap stone, completing 2,000 feet of sea-wall foundations, and the delivery of 1,882 cubic yards of building stone, at a total cost of $25,448.32; the building of 1,125 feet of concrete block sub-base for sea wall, at a cost of $4,342.41; 66 per cent of the reclamation of 43 acres, which completed that area, and 28 per cent of the reclamation of 76 acres still under way; surveys costing $658.63; the operation and maintenance of the U. S. tug *Castle*, at a cost of $3,605.62; the construction and purchase of 18-inch hydrau-

lic dredge *Talcott*, $60,000; 1 rowboat, *No. 7*, $99.59; 1 pontoon, *No. 31*, $108.49; two scows, *Nos. 9* and *10*, begun during the previous fiscal year, $4,103.05; maintenance and repair of floating plant, $7,100.84; the purchase of coal for dredging operations, $2,354.01; and engineering, clerical, office and miscellaneous expenses, $12,777.26. The expenditures for the fiscal year were $172,090.37, all for new work. The work was carried on partly by contract and partly by hired labor. The amount of land reclaimed at the end of the year was 84 acres brought to completion and 76 acres under way.

Respectfully submitted.

LOUIS BROWNLOW,
JOHN G. D. KNIGHT,
W. GWYNN GARDINER,
Commissioners of the District of Columbia.

REPORT OF THE OPERATIONS OF THE ENGINEER DEPARTMENT OF THE DISTRICT OF COLUMBIA.

REPORT OF THE ASSISTANT ENGINEER COMMISSIONER.

OFFICE OF THE ENGINEER COMMISSIONER
OF THE DISTRICT OF COLUMBIA,
Washington, D. C., October 1, 1918.

SIR: I have the honor to transmit herewith annual reports for the fiscal year ended June 30, 1918, of the various divisions and offices under my supervision.

In the prosecution of the usual activities of the engineer department the year was marked by extraordinary difficulties, arising from adverse conditions created by the war. Labor has been exceedingly scarce and materials hard to obtain. Wages for per diem laborers and mechanics were increased during the year by percentages ranging from 20 to 50 per cent, but in spite of this action it has been possible to maintain working forces at only a fraction of their normal size. This difficulty has been experienced not only by the department itself but by contractors as well. As a result, very slow progress has been made on all new projects of construction, even where available funds have been sufficient for the purpose.

From the experience of the year just closed, and in view of a very probable greater scarcity of labor in the near future, it is apparent that all operations during the fiscal year 1919 must be reduced to a minimum consistent with public necessity, those activities which may be considered as being essential to the national interest in the present emergency receiving first consideration.

It is apprehended that a most serious situation will develop during the year just begun in the matter of obtaining and retaining in the service a sufficient number of suitably qualified employees to fill positions provided on the annual or statutory rolls. This difficulty will be due in large part to the relatively low salaries provided for such employees.

It is considered imperative that some corrective measures be adopted to better conditions in this respect; the most practicable method, it is thought, would be to obtain a lump-sum appropriation, to be used by the commissioners in their discretion to increase annual compensations during the war.

I take this occasion to express my appreciation of the loyalty and zeal shown by all heads of departments and the employees under them. In addition to the unusual amount of work thrown upon them they have universally offered and given their services voluntarily whenever required in assisting in registration work and in the work undertaken by local exemption boards.

Very respectfully,

J. J. LOVING,
Colonel, Engineers, United States Army,
Assistant to the Engineer Commissioner.

The ENGINEER COMMISSIONER
OF THE DISTRICT OF COLUMBIA.

REPORT OF ENGINEER OF HIGHWAYS.

WASHINGTON, D. C., *September 20, 1918.*

SIR: I have the honor to submit the following report of the operations of the engineer of highways for the fiscal year ended June 30, 1918. The total amount of funds appropriated by Congress and deposited by corporations and others for disbursement by the surface division aggregated $1,602,181, of which $220,000 was for paving sidewalks and alleys in all parts of the District; $761,150 for paving new roadways and repairing old roadway pavements; $335,700 for construction and repair of suburban roads; $94,500 for construction and repair of bridges and viaducts; $25,000 for grading streets and avenues; $25,000 for sidewalks and curbs around Government reservations, buildings, and parks; $140,831 was spent in repairing pavements disturbed by other branches of the District government and by various corporations and others.

Summary of work under appropriation for improvements and repairs for year ended June 30, 1918.

Character of work.	Streets and avenues.	Suburban roads and streets.	Repairs to asphalt pavements.	Total.
Sheet asphalt pavement.....square yards..	78,633.24	14,418.03	16,036.96	109,088.23
Asphalt surface.....do....	.....	.....	34,377.74	34,377.74
Asphalt block pavement.....do....	22,960.38	.....	.....	22,960.38
Vitrified block gutters.....do....	5,997.44	895.90	3,499.18	10,392.52
Cement concrete pavement.....do....	.....	21,042.95	.....	21,042.95
Macadam roadway.....do....	.....	72,704.00	.....	72,704.00
Cobble and granite gutters.....do....	.....	17,747.42	.....	17,747.42
Cement gutters.....linear feet..	.....	2,318.00	.....	2,318.00
Old pavement removed.....cubic yards..	.....	.....	4,006.35	4,006.35
Old cobble and granite removed.....square yards..	33,893.00	5,084.00	.....	38,977.00
Granite and bluestone curb set.....linear feet..	16,351.77	4,028.14	6,965.52	27,345.43
Cement curb formed and laid.....do....	.....	14,704.68	.....	14,704.68
Curb reset.....do....	29,821.50	7,860.80	14,060.94	51,743.24
Grading.....cubic yards..	25,312.00	305,534.00	2,184.50	333,030.50
Sidewalks and curbs, under assessment and permit work.....square yards..	.....	.....	.....	36,986.48
Sidewalks and curbs around Government reservations.....square yards..	.....	.....	.....	5,957.13
Sidewalks, whole cost.....do....	.....	.....	.....	853.26
Alley pavements, assessment work:				
Asphalt block.....	.....	.....	.....	2,681.66
Vitrified block.....	.....	.....	.....	4,054.00
Cement.....	.....	.....	.....	13,647.00

The following is a list of tables appended to the report:

Table A.—Street railways in the District of Columbia, July 1, 1918.

Tables B and C.—Statement of character and extent of street pavements.

Table E.—Schedule of work on streets and avenues and county roads, and suburban streets.

Table F.—Repairs to asphalt and coal-tar pavements.

Table G.—Work done for street railway companies.

Table H.—Work done by day labor under appropriation for "Repairs to streets, avenues, and alleys."

Table I.—Regular permit work.

Table K.—Assessment work.

Table L.—Replacing and repairing sidewalks and curbs around public reservations.

Table M.—Miscellaneous work.

Table O.—Repairs to cuts by plumbers and others.

Table N.—Whole cost work.

Table P.—Grading streets, alleys, and roads.

Of the above tables, A, B, and C, and O, are printed herewith. The remaining tables are on file in the record room of the office of the engineer of highways, plan case number "B-916."

The dominating condition that has characterized the past year's work has been the scarcity and high cost of labor and material. The annual and per diem personnel has been largely affected by separations therefrom of individuals entering the military

service. The working forces of our day labor gangs and our contractors' organizations have been reduced by significantly one-half as a result of the unprecedented volume and urgency of physical activities related to the war that have been in progress in this vicinity. Due to these conditions and especially due also to the fact that our work was restricted to eight hours by law while the activities named were not, and notwithstanding the payment by us of largely increased wages and at weekly intervals instead of semimonthly as heretofore, the productive results of our working organizations were curtailed to such a degree that at the end of the year much construction work was practically unjustifiable and repair work only accomplished with extreme difficulty and in amounts limited to the base necessities of traffic.

It is a matter of congratulation that the general state of the program of the year's work at the date of this report can be stated as favorably as it can. With one exception, the program of concrete roadway construction, all our 1918 work is so advanced that its completion this working season is anticipated. The concrete roadway contract was the largest of its kind in our experience, about 75,000 square yards, and is now only about half done, due to the general conditions related above. Sheet asphalt roadways were laid most generally on city streets and on suburban streets carrying considerable traffic and a smaller area of asphalt block pavement on the same class of streets where the conditions were suitable.

Alleys were paved with cement concrete, vitrified blocks, and asphalt blocks, the types being named in the order of most frequent usage. The yardage of cement concrete alleys laid was 13,037, of vitrified blocks 4,055, and of asphalt blocks 2,681.

The viaduct on the line of Sixteenth Street NW., crossing Military Road, was completed as was the grading of this street from Montague Street to Alaska Avenue. This is an incomplete item of the previous year's work and together with Massachusetts Avenue from Nebraska Avenue to the District line NW., and Rhode Island Avenue, NE., from South Dakota Avenue to the District line, constitute three items still in process of completion, all of which were characterized by complex construction processes that properly required more than a year's time for their execution.

A contract for the construction of Bennings viaduct was executed and is in progress.

Macadam stone for construction and repair of suburban roads and streets was almost entirely of trap rock from the District quarry at Dickerson, Md., with small additional usages of limestone.

MUNICIPAL ASPHALT PLANT.

The total output of the municipal asphalt plant for the year was 185,952 cubic feet of material, consisting of 151,152 cubic feet of old material mixture, 22,056 cubic feet of asphaltic concrete mixture, and 12,744 cubic feet of topping mixture. The plant was operated for 214 days with an average daily output of 869 cubic feet, or an increase in the daily average over that of last year's output of 132 cubic feet. In connection with the output of the plant the crusher was operated for 101 days during the year and 3,159 cubic yards of old material hauled to the plant from the various streets was crushed.

Hauling by motor trucks was introduced during the year and this innovation in the method of hot haul was found to be both economical and advantageous. About 90 per cent of the hot haul is now being performed by motor trucks which have replaced the old horse-drawn carts and wagons. Constant attention is given to the maintenance of both the plant and the crusher, repairs being made and parts replaced when necessary, thereby keeping them in the best operating condition possible. This cost is incorporated in the total cost of output shown below.

The following materials in amounts set forth below were purchased for use in manufacturing the output during the year:

Sand, 2,675.25 cubic yards, cost	$1.43
Haul of bank sand, 418 cubic yards, cost	1.20
Asphaltic cement, 368.35 tons, cost	19.10
Asphaltic cement, 57.50 tons, cost	26.34
Limestone dust, 250 tons, cost	3.63
Screenings, 500 tons, cost (average)	1.30

There were purchased for use in operating the crusher and mixer the following large items:

Fuel oil, 34,046 gallons, cost	$0.061
Coal, 185 tons, cost (average)	6.38
Wood, 20 cords, cost (average)	5.00

The cost of operation, including material and labor, are kept from day to day, and the summary of this data for the fiscal year develops the following unit costs for the year's operations:

OPERATION OF CRUSHER.

Period of operation, 101 working days; output of crusher, 3,159 cubic yards.

Labor and fuel	$3,008.47
Cost per cubic yard, $0.9523.	
Maintenance, renewals, and repairs	280.65
Cost per cubic yard, $0.0888.	

Overhead costs: The original cost has been amortized by deducting 20 per cent from same each year for the last five years.

Cost of crushed product per cubic yard:	
Labor and material	$0.9523
Repairs to plant	.0888
Total cost	1.0411

OPERATION OF PLANT.

Period of operation, 214 days; total output, 185,952 cubic feet.

At plant:	
Labor (4.24 cents per cubic foot)	$7,885.05
Fuel oil (1.06 cents per cubic foot)	1,972.52
Coal (0.41 cent per cubic foot)	764.32
Wood (0.20 cent per cubic foot)	377.14
Binder stone (0.02 cent per cubic foot)	31.20
Total (5.93 cents per cubic foot)	11,030.23
Haul from plant to street:	
Labor (4.98 cents per cubic foot)	8,269.87
On street:	
Labor (19.22 cents per cubic foot)	31,914.45
Painting joints (0.37 cent per cubic foot)	613.11
Wood (0.15 cent per cubic foot)	282.86
Total (19.74 cents per cubic foot)	32,810.42
Maintenance and repairs:	
At plant (1.68 cents per cubic foot)	3,147.56
On street (0.20 cent per cubic foot)	332.27
Total (1.88 cents per cubic foot)	3,479.83

Overhead: The original cost has been amortized by deducting 20 per cent from same each year for the last five years.

Supervision:	
Foremen and overseers (4.32 cents per cubic foot)	$8,025.65

Total manufacturing cost per cubic foot:	Cents.
Plant, labor	5.93
Hot haul	4.98
Street work	19.74
Maintenance of plant and tools	1.88
Supervision	4.32
	36.85

The sand used was bought under contract at 59 cents per cubic yard and hauled from the wharf to the plant at a cost of $2,585.57 for 2,675.25 cubic yards, or 84 cents per cubic yard, a total of $1.43 per cubic yard. In addition to this sand 418 cubic

yards of bank sand were hauled to the plant and used in the various mixtures, the cost of this haul being $1.20 per cubic yard. All other expendable material was delivered at the plant site at the cost thereof used herein.

The cost of a cubic foot of old material mixture from the above was as follows:

0.60 cubic foot of old material, at $1.05 per cubic yard	$0.0233
0.34 cubic foot of sand, at $0.59 per cubic yard, hauled, $0.84 per cubic yard	.0180
2.10 pounds limestone dust, at $3.63 per ton	.0038
4.12[1] pounds asphaltic cement, at $19.10 per ton	.0393
Cost of material	.0844
Manufacturing and placing cost	.3685
Total cost per cubic foot	.4529

Asphaltic concrete mixture:

0.50 cubic foot screenings, at $1.30 per ton (2,000 pounds)	.0331
0.50 cubic foot sand, at $0.59 per cubic yard, haul $0.84 per cubic yard	.0265
4.20 pounds limestone dust, at $3.63 per ton	.0076
9.16[1] pounds asphaltic cement, at $19.10 per ton	.0875
Cost of material	.1547
Manufacturing and placing cost	.3685
Total cost per cubic foot	.5232

Topping mixture:

1.00 cubic foot of sand, at $0.59 per cubic yard, haul $0.84 per cubic yard	.0530
4.20 pounds limestone dust, at $3.63 per ton	.0076
9.16[1] pounds asphaltic cement, at $19.10 per ton	.0875
Cost of material	.1481
Manufacturing and placing cost	.3685
Total cost per cubic foot	.5166

The total cost of minor repairs to sheet-asphalt pavements during the year, the same representing the maintenance cost during the year was $51,49.307. This cost represented the maintenance of all asphalt streets not under guarantee by contractors, a total yardage of 3,064,706. The cost per square yard per year was therefore about 1.7 cents.

For purposes of record and comparison the like annual costs are here stated for past years: 1908, 3.8 cents; 1909, 2.3 cents; 1910, 2.6 cents; 1911, 2.2 cents; 1912, 2.4 cents; 1913, 2 cents; 1914, 1.9 cents; 1915, 1.9 cents; 1916, 1.8 cents; 1917, 1.5 cents.

The municipal asphalt plant began operations in 1912, repairs being made by contract during the first quarter of that year and with the municipal plant during the last three quarters of the year and continuously since. The marked reduction for the year 1917 is affected very significantly by the law effective that year by which repairs to pavements over one year old is chargeable to repair appropriations instead of being paid for by the paving contractors under a five-year guarantee as formerly. The yardage of pavement over which our repairs were distributed was thus increased by nearly 700,000 square yards, on which practically no expenditures were needed as the pavements were only from one to five years old.

My acknowledgements are due to the employees of this division for the work accomplished by the office during the year.

I transmit herewith the reports of the engineer of bridges, the superintendent of streets, and the superintendent of suburban roads.

Very respectfully,

C. B. HUNT,
Engineer of Highways.

ASSISTANT TO THE ENGINEER COMMISSIONER.

[1] 10 per cent tare.

Statement showing employees temporarily required in connection with street, road, and bridge construction and repairs, and appropriations and deposits from which paid during fiscal year ended June 30, 1917.

SURFACE DIVISION.

Designation.	Number.	Rate per diem.
Assistant engineers	3	1 at $5; 2 at $6.
Inspectors	15	1 at $3.50; 14 at $4 and $4.50.
Copyists	6	2 at $3; 3 at $3.50 and $4.50; 1 at $4.75.
Computers	2	1 at $5; 1 at $5 and $5.50.
Overseers	5	2 ar $4; 1 at 4 and $5.

APPROPRIATIONS FROM WHICH PAID.

Improvements and repairs, District of Columbia, 1918	$26,349.68
M Street Bridge across Rock Creek	345.50
Construction of suburban roads and suburban streets, District of Columbia, 1918	3,342.25
Total	29,937.43

REPORT OF THE SUPERINTENDENT OF STREETS.

SIR: I have the honor to submit, herewith, the annual report of the operations under various appropriations for fiscal year ending June 30, 1918.

Table H is a summary of work done under the appropriation for current repairs to streets, avenues, and alleys. The cost of such work was $76,446.95, including repairs to dangerous holes.

Table I is a list of work done under the permit system, wherein the property owners requested the improvements and paid one-half the cost, the District paying the other half. The cost of this work was $8,397.29.

Table K is a list of work done under the assessment system. One-half the cost of such work is charged against the abutting property. The total cost was $247,676.89.

Table L is a list of work paid from the appropriation for replacing sidewalks and curbs around public reservations. The amount expended was $8,411.38.

Table M is a list of miscellaneous work charged to various appropriations other than the above.

Table N is a list of work done for individuals at their cost.

Table P is a list of work done under appropriation for grading streets, alleys, and roads.

Very respectfully,

H. N. MOSS, *Superintendent of Streets.*

To the ENGINEER OF HIGHWAYS.

REPORT OF THE SUPERINTENDENT OF SUBURBAN ROADS.

OCTOBER 9, 1918.

ENGINEER OF HIGHWAYS, DISTRICT OF COLUMBIA.

SIR: The following report of work during the fiscal year ended June 30, 1918, is respectfully submitted:

Construction of suburban roads and suburban streets.—Work was continued during the year on improvements under contract which were authorized by the District of Columbia appropriation act for the fiscal year 1917. All of the work authorized for the year was completed except upon the following items:

Sixteenth Street NW. between Montague Street and Alaska Avenue: On this item the heavy grading was completed, 47,259 cubic yards having been done. The viaduct over Military Road was finished. No other work was undertaken, on account of shortage of labor

Rhode Island Avenue NE. between South Dakota Avenue and District of Columbia line: The heavy grading was completed, 29,759 cubic yards having been done; and the work of macadamizing and guttering was in progress at the end of the year.

Massachusetts Avenue NW. betweeh Nebraska Avenue and District of Columbia line: The heavy grading, amounting to 78,254 cubic yards, was completed; and work on gutters and macadamizing was in progress at the end of the year.

On U Street and Shannon Place SE. and on Colorado Avenue NW. between Montague and Thirteenth Streets no work was undertaken on account of failure of condemnation proceedings.

The total amount of heavy grading done on 1917 projects completed during the year was 216,348 cubic yards.

On work authorized for the fiscal year 1918 contracts were entered into with the G. B. Mullin Co. for grading and paving gutters and with E. G. Gummel for paving cement roadways, as well as with various parties for the heavy grading required. On account of difficulty in obtaining sufficient laborers, the work proceeded slowly, especially under the contract for paving cement roadways, which was only about 28 per cent completed at the close of the year.

Under the contract with the G. B. Mullin Co., there were done 4,714 cubic yards grading and 7,658 cubic yards of paved gutters; and 23,458 square yards of macadam roadway were laid by the District force.

Under the contract with E. G. Gummel there were completed 3,963 cubic yards of grading, 12,377 linear feet of cement curb, 744 linear feet of granite curb, and 21,043 square yards of cement pavement.

The heavy grading items done under contract amounted to 71,231 cubic yards.

Uncompleted work authorized was progressing slowly at the close of the year.

Repairs to suburban roads.—The appropriation for the year was $150,000. On account of the abnormal increase in traffic due to war activities in this vicinity, the roads and suburban streets were badly worn during the year and were kept in repair with difficulty. The customary force of laborers could not be maintained on account of the high prices being paid by contractors engaged at Government work on a percentage basis, although the rates of wages paid by the District for labor and teams was advanced about 80 per cent above the prices before the war.

Embargoes were placed on deliveries of road materials, except as authorized by the United States Highway Council. All material for construction increased in price, and the available funds were insufficient for the work required. Due to these causes, efforts were concentrated upon the upkeep of the main roads carrying heavy travel, and the minor streets and roads were necessarily given little attention. By this means the main highways were at the end of the year in passable though rough condition. The expenditures for repairs, exclusive of oiling, upon some of these main roads during the year 1918 was as follows:

Canal Road NW., Thirty-sixth Street to Chain Bridge	$1,279.22
Connecticut Avenue NW., Cathedral Avenue to Chevy Chase Circle	4,829.06
Massachusetts Avenue NW., California Avenue to Nebraska Avenue	6,451.48
Wisconsin Avenue NW., Thirty-fifth Street to District line	3,601.84
Georgia Avenue NW., Rock Creek Church Road to Buchanan Street	5,003.85
Georgia Avenue NW., Buchanan Street to District line	2,148.01
Michigan Avenue NE., North Capitol Street to Eighteenth Street	1,307.61
Bladensburg Road NE., H Street to South Dakota Avenue	8,242.32
Rhode Island Avenue NE., Fourth Street to South Dakota Avenue	1,487.46
Nichols Avenue SE., Sheridan Road to South Capitol Street	1,409.36

The detailed statements of expenditures are not here printed, but filed in the office of the engineer of highways, plan case B, No. 916. Their consolidation gives the following recapitulation:

Main thoroughfares, general repairs (items over $1,000)	$36,963.72
Oiling	15,177.13
Watering	3,050.03
Old material and cinder roadways and walks	3,747.32
Miscellaneous work (items less than $1,000)	22,197.79
Minor repairs and maintenance	54,271.93
Outstanding bills	14,592.08
	150,000.00

It is evident that increased expenditures for repairs must be expected for several years. As far as possible, the necessity for heavy repairs to the macadam roads should be eliminated by repaving them with pavements of a fixed character.

L. R. GRABILL,
Superintendent Suburban Roads, District of Columbia.

REPORT OF ENGINEER OF BRIDGES.

WASHINGTON, D. C., *August 26, 1918.*

SIR: I have the honor to submit the following report of the operations under my charge for the fiscal year ending June 30, 1918.

The expenditures from the appropriation for the construction and repair of bridges were as follows:

Bridge No.	Character of work.		Cost.
1	Chain Bridge, paint		$877.70
54	Pennsylvania Avenue Bridge SE., install lights		57.78
35	M Street over Rock Creek, repairs		280.79
118	Pennsylvania Avenue over Rock Creek, paint		192.41
27	Connecticut Avenue over Klingle Road, refloor		2,940.43
135	Forty-first and Blaine Streets, construct culvert		2,242.51
35	M Street over Rock Creek, paint		202.44
	Construct portable field office		34.02
30	Calvert Street, minor repairs		54.61
34	P street, minor repairs		101.62
			6,984.31
	Dangerous holes and minor repairs:		
	July, 1917	$198.68	
	August, 1917	196.70	
	September, 1917	85.53	
	October, 1917	17.17	
	November, 1917	275.05	
	December, 1917	123.83	
	January, 1918	52.48	
	February, 1918	25.61	
	March, 1918	37.32	
	April, 1918	29.10	
	May, 1918	166.68	
	June, 1918	147.35	
			1,355.50
	Hire of horse and buggy for inspector		331.67
	Printing		24.73
	Tools		25.01
	Coal		26.10
	Salaries, engineer of bridges' office		2,796.75
	Lumber purchased for stock		3,891.68
	Contract 3261, viaduct in line of Sixteenth Street NW		1,326.25
	Contract 6312, two culverts in line of Sixteenth Street NE		2,700.79
	Contract 6519, culvert at New York Avenue and Bladensburg Road NE. (estimated)		4,000.00
	Miscellaneous		1,406.57
			24,869.36
	Less overhead expenses	$624.52	
	Less lumber purchased from previous appropriations	154.44	
			778.96
	Total net expenditures		24,090.40
	RECAPITULATION.		
	Appropriation		25,000.00
	Repayment by railway companies		635.10
			25,635.10
	Total net expenditures		24,090.40
	Balance		1,544.70
			25,635.10

Repainting: Bridge No. 1 (Chain Bridge) and No. 55 (Anacostia Bridge) completed. Work on these two bridges was commenced the previous fiscal year. Bridge No. 35 (M Street over Rock Creek) commenced. Water mains in the Meigs Bridge (No. 118).

Reflooring: Bridge No. 35. Bridge No. 27 (Connecticut Avenue crossing Klingle Road) partially completed.

Pier and channel lights were installed on Bridge No. 54 (Pennsylvania Avenue SE.).

A concrete culvert, replacing the former timber bridge (No. 135) on Forty-first Street south of Benning Road was built by day labor.

The construction of a portable field office was in progress at the close of the fiscal year.

Reconstruction of a portion of the retaining wall on the south side of the Canal Road, under contract No. 6187 with W. D. Murray & Co., is still in progress.

Contract No. 6355, for the reconstruction of a further portion of the wall, was made with Wm. F. Cush. Upon failure of the contractor to commence work the contract was annulled and the work readvertised.

The following contracts were completed: Contract 6261 with Charles H. Tompkins for the construction of a reinforced concrete viaduct in the line of Sixteenth Street crossing Military Road. Total cost, $35,406.19. Contract No. 6293 with Richard J. Beall for the construction of a reinforced concrete platform and wall at the east end of the M Street Bridge over Rock Creek (Bridge No. 35). Total cost, $9,015.57. Contract No. 6312 with Edward G. Gummel for the construction of two concrete culverts in the line of Sixteenth Street between Southern Avenue and Clay Street NE. (Bridges No. 133 and 134). Total cost, $7,909.96.

Contract No. 6519 was made with Charles H. Tompkins for the construction of a concrete culvert at the intersection of New York Avenue and Bladensburg Road NE. The work is to be done on a basis of cost, plus 20 per cent, and is estimated to cost $4,000.

Benning viaduct: After the rejection of bids under the second invitation for proposals an additional appropriation of $50,000 was made in the deficiency bill, approved October 6, 1917, making the total available funds $195,000. The work was again advertised and the bid of the Snare & Triest Co. of $186,420 was the lowest of four received. Contract No. 6475 was executed with this company on January 12, 1918. The work is now in progress.

Wharf between M and N Streets SW.: Plans and specifications for this work, commenced the previous fiscal year, were completed and bids for the work invited. No proposals were received. It will be readvertised later.

South Dakota Avenue: Plans and specifications for a viaduct in the line of South Dakota Avenue NE, crossing the tracks of the Baltimore & Ohio Railroad, were completed, but proposals for the work have not yet been requested, the condemnation proceedings for the land required not having been completed.

Calvert Street Bridge (Bridge No. 30): This bridge was constructed in 1891 by the Edgemoor Bridge Co. for the Rock Creek Railway Co. It has been maintained and repaired by the District by authority of an act of Congress of August 7, 1894. In 1911 it was narrowed and strengthened to check excessive vibration, the roadway being reduced in width from 39 to 26 feet. This width is insufficient for the traffic which crosses the bridge as the railway traffic practically absorbs the roadway.

The act making appropriations for the District of Columbia for the fiscal year ending June 30, 1917, included an item for the preparation of plans for the construction of a bridge to take the place of the existing Calvert Street Bridge. The plan submitted by Mr. George O. Totten, architect, was approved by the Commissioners, District of Columbia, and by the Fine Arts Commission. It provides five masonry arches with stone trim and stone balustrade. The middle arch has a span of 157 feet and is flanked by two smaller arches on each side having spans of 103 and 56 feet. Based upon the prices of labor and materials which prevailed in 1915, I estimate the cost of the bridge at $820,000. To meet the present prices of labor and materials the estimate of cost should be increased 75 per cent, making it $1,435,000. In view of the cost of labor and materials now prevailing, the construction of this bridge should be deferred until after normal conditions shall have been reestablished.

To meet the present traffic conditions I have prepared an estimate of the cost of widening and strengthening the existing structure which contemplates moving the south trusses with their supports southward 17 feet, the emplacement of trusses in the new center line of the bridge, a wood-block floor upon buckle plates in the roadway, which will be 42 feet wide, and two footways, each 6 feet wide. Provision is also made for a double-track underground trolley railway. The estimated cost of this structure at present unit rates is $193,000, which does not include the cost of the railway work, as that should be provided for by the railway company, the estimated cost being $15,000.

Considering the deferred construction of the monumental structure as inevitable the cost of the improvement of the existing bridge instead of the more expensive structure would involve no actual financial loss if it be assumed that the construction of the masonry bridge will be deferred for at least five or six years. Assuming that the present worth of money is 4½ per cent per year, the interest on the cost of the masonry structure would be (on the basis of $820,000 considered as the cost under normal conditions) $36,900 per annum. With proper care and renewal of painting the life of the modified structure would be of indefinite duration and it would provide ample capacity for traffic conditions in the future as far as can now be foreseen.

I respectfully recommend that an appropriation of $193,000 be requested for widening and strengthening the Calvert Street Bridge across Rock Creek (Bridge No. 30).

Very respectfully,

D. E. McComb,
Engineer of Bridges.

The Engineer of Highways.

87557—18——3

TABLE A.—*Street railroads in operation in District of Columbia June 30, 1918.*

Name of company.	Underground electric.		Overhead electric.		Total.
	Double track.	Single track.	Double track.	Single track.	
	Miles.	*Miles.*	*Miles*	*Miles.*	
Washington Railway & Electric Co	23.09	6.34	26.77	3.99	60.19
Capital Traction Co	20.19	4.30	3.57	.....	28.06
Washington & Virginia Co	.....	.46	.....	.....	.46
East Washington Traction Co	.....	.....	.....	.50	.50
Washington Interburban Co	.....	.....	.....	2.65	2.65
Washington & Maryland Co	.....	.....	.....	2.33	2.33
Total	43.28	11.10	30.34	9.47	94.19
Tracks used in common by Capital Traction Co. and Washington Railway & Electric Co	1.55	.....	.....	.....	.....
Tracks used in common by Washington Railway & Electric Co. and Washington & Virginia Co	.70	.....	.....	.....	.....
Total	45.53	11.10	30.34	9.47	96.44

TABLES B AND C.—*Character and extent of roadway pavements July 1, 1918.*

SQUARE YARDS.

Section.	Asphalt.	Asphalt block.	Asphaltic concrete, concrete base.	Asphaltic concrete, stone base.	Cement concrete.	Durax block (small granite block.)	Granite and rubble.
Northwest, city	1,756,798	26,455	9,674	6,372	1,218	12,294	117,438
Northeast, city	382,747	200,671	3,127	.....	.....	.....	18,289
Southeast, city	218,921	249,573	8,019	4,082	.....	.....	42,872
Southwest, city	270,062	40,436	13,535	.....	4,210	.....	160,354
Georgetown	153,972	23,075	4,144	905	.....	.....	36,166
Northwest, suburban	302,416	79,087	25,855	36,680	86,988	.....	23,945
Northeast, suburban	58,347	6,925	14,354	.....	18,814	.....	5,971
Southeast, suburban	14,494	.....	.....	3,049	5,000	.....	1,000
	3,157,757	626,222	78,708	51,088	116,230	12,294	406,035

Section.	Vitrified block.	Cobble.	Macadam. (estimated)	Gutters on asphaltic streets.	Gutters on asphaltic concrete streets.	Pavements maintained by street railroads.	Total.
Northwest, city	9,855	27,350	50,400	115,771	1,128	285,995	2,420,748
Northeast, city	3,882	.....	52,550	30,737	231	69,316	761,550
Southeast, city	.....	13,122	46,700	15,567	898	48,328	648,082
Southwest, city	3,138	9,246	10,300	23,906	1,254	56,820	593,261
Georgetown	515	12,618	3,000	5,750	498	31,816	272,459
Northwest, suburban	.....	.....	1,329,256	23,916	5,871	54,668	1,968,682
Northeast, suburban	.....	.....	370,330	4,881	1,049	9,000	489,671
Southeast, suburban	.....	.....	80,371	5,633	272	7,370	117,189
	17,390	62,336	1,942,907	226,161	11,201	563,313	7,271,642

MILEAGE.

Section.	Asphalt	Asphalt block.	Asphaltic concrete, concrete base.	Asphaltic concrete, stone base.	Cement concrete.	Durax block (small granite block).
Northwest city	90.44	1.57	0.51	0.24	0.08	0.30
Northeast, city	19.93	8.99	.19	.....	.....	.....
Southeast, city	11.74	12.43	.43	.17	.....	.....
Southwest, city	14.68	2.37	.68	.....	.22	.....
Georgetown	9.14	1.51	.49	.06	.....	.....
Northwest, suburban	16.77	4.25	1.31	2.00	4.89	.....
Northeast, suburban	3.87	.63	.97	.....	1.04	.....
Southeast, suburban	1.21	.....	.....	.21	.48	.....
	167.78	31.75	4.58	2.68	6.71	.30

TABLES B AND C.—*Character and extent of roadway pavements July 1, 1918*—Contd.

MILEAGE—Continued.

Section.	Granite and rubble.	Vitrified block.	Cobble.	Macadam (estimated).	Gravel and unimproved (estimated).	Total.
Northwest, city	6.20	0.50	1.30	2.46	3.12	106.72
Northeast, city	.91	.24	.....	2.96	4.75	37.97
Southeast, city	2.50	.....	.66	2.21	7.69	37.83
Southwest, city	8.25	.27	.41	.52	2.90	30.30
Georgetown	2.39	.03	.64	.06	.76	15.08
Northwest, suburban	1.13	.....	.....	83.00	54.80	168.15
Northeast, suburban	.61	.....	.....	26.25	43.65	77.02
Southeast, suburban	.04	.....	.....	6.30	35.82	44.06
	22.03	1.04	3.01	123.76	153.49	517.13

TABLE O.—*Number of square yards and cost of repairs to cuts in streets, avenues, and alleys during the fiscal year ended June 30, 1918.*

Item No. 1 shows the cost of repairs to cuts charged various plumbers, public-service corporations and individual depositors. Five per cent is added to "whole cost work" for the maintenance of the miscellaneous trust fund deposits (District of Columbia) operating account, streets, this fund being used to pay for labor, tools, various materials, etc., used in connection with the repairing of cuts.

Item No. 2 shows the cost of work done on account of various appropriations of the sewer department.

Item No. 3 shows the cost of work done on account of the water department.

Item No. 4 shows the cost of work charged against other appropriations of the District of Columbia and various appropriations of the General Government.

Item No. 5 shows the number of square yards of various kinds of pavements repaired.

PLUMBERS, PUBLIC-SERVICE CORPORATIONS, AND INDIVIDUAL DEPOSITORS.

	Flat rate.	Whole cost.	Total.
Item No. 1:			
Plumbers	$8,935.05	.....	$8,935.05
Corporations	28,799.90	$49,720.90	78,520.80
Individual depositors	1,602.15	8,629.15	10,231.30
Item No. 2.			
Sewer department	1,313.59	8,134.24	9,447.83
Item No. 3:			
Water department	4,439.77	2,649.29	7,089.06
Item No. 4:			
Miscellaneous appropriations	6,369.30	20,237.91	26,607.21
Total	51,459.76	89,371.49	140,831.25

	Square yards.		Total.
	Flat rate.	Whole cost.	
Item No. 5:			
Sheet asphalt	$2,842.02	$8,907.26	$11,749.28
Vitrified block	629.64	2,157.70	2,787.34
Asphalt block	1,332.72	4,000.28	5,333.00
Granite block	724.48	3,200.16	3,924.64
Cobble	142,46	432.26	574.72
Brick	221.28	3,830.48	4,051.76
Macadam	664.86	580.20	1,245.06
Cement sidewalk	11,474.96	.....	11,474.96
Durax block	.....	4,541.60	4,541.60
Scoria block	.....	837.34	837.34
Total	18,032.42	28,487.28	46,519.70

Total number of charges made for repairing cuts, etc., 6,805.

REPORT OF SUPERVISOR OF CITY REFUSE.

WASHINGTON, D. C., *October 1, 1918.*

Sir: I have the honor to submit the following report of the street-cleaning division, engineer department, for the fiscal year ended June 30, 1918:

The operations of the street-cleaning division involve two distinct functions—the disposal of waste material originating on public property, commonly known as street cleaning, and the disposal of waste materials originating on private property, commonly known as city wastes. The street cleaning was done by the municipality directly, while the city wastes were removed by contract.

STREET CLEANING.

The work of cleaning the city's streets has become more difficult and extensive, owing to the large increase in population and traffic and the scarcity of labor.

Because of this scarcity of labor the division was unable to maintain its policy of increasing the area of streets cleaned by hand patrol or "white wings" and it has been necessary to increase the area of machine-cleaned territory and correspondingly reduce the area of hand patrol.

The oiling of macadam and other suburban roadways with emulsified road oil for the purpose of laying dust was discontinued during this year because this division was unable to secure any of this material at a reasonable price. It became necessary, therefore, to revert to the old and less efficient method of laying dust by sprinkling with water.

During the winter considerable snow and ice work was done and there were long periods during which no regular street-cleaning work could be performed. On one occasion it was necessary to use all the available labor in the employ of the District government for snow and ice removal. The total direct expenditures for this work amounted to $30,337.64, in comparison with $5,550.35 of last year.

A comparison of the yardage cleaned during the year with that of 1917 indicates a decrease in all classes of work except motor flushing. This was principally due to the fact that there were fewer days on which cleaning could be done but was also due to the fact that many times crews were compelled to work short of help and this materially reduced the efficiency of the work of the crew. The yardage cleaned by motor flushing shows an increase as the motor flusher had not been operating for a full year previous to June 30, 1917.

The direct total costs and unit costs per 1,000 square yards are all increased, but owing to the increased population, as given in the 1917 police census, the cost per capita per annum is less. The cost per capita for 1918 was $1.443, as compared with $1.547 for 1917.

The increase in unit costs, while partially due to the increased cost of materials and supplies and the fewer days on which cleaning work could be performed, is mainly due to the increased cost of labor. At the beginning of the fiscal year the wages for laborers and drivers were $1.50 and $1.75, respectively. During the year these wages were increased to $2.50 and $2.75, respectively. This increase of a dollar a day was given at the rate of 25 cents a day at four different times, namely, in June, November, March, and April. On numerous occasions certain classes of work could not be done owing to the shortage of labor. .

CITY WASTES.

Contracts for all classes of city wastes expired June 30, 1918, and new proposals were returnable July 2, 1917. These proposals included plans and specifications which were prepared with the endeavor to secure the type of equipment which would have been operated by the municipality had municipal collections been authorized, and likewise to require that all buildings or plants erected in or near the District be of a sightly and sanitary nature.

The proposals for the collection and disposal of ashes, night soil, and dead animals were accepted. The proposals for the collection and disposal of miscellaneous refuse and garbage were rejected, as the prices were considered excessive.

New proposals were advertised, with the plans and specifications, simply modifications of the contracts in force. These proposals were opened September 5, 1917, and the miscellaneous refuse proposal rejected. The garbage proposal of $143,400 was accepted, but the Washington Fertilizer Co., on November 30, forfeited their bond of $3,000 rather than enter into this contract.

Proposals for the collection and disposal of garbage were again solicited and opened March 20. One bid, $184,800, was received and this bid was rejected because the price was believed to be unreasonable.

A request was then made to Congress for an appropriation to make possible the purchase of the Washington Fertilizer Co.'s plant and equipment and to enable the District to perform the work.

On June 14 the commissioners entered into contract with the Washington Fertilizer Co. to purchase the plant and equipment for the sum of $85,000, subject to the appropriation of Congress; the purpose being to take over the entire plant, equipment, and working force on July 1, 1918, and operate under practically the same lines as previously until the entire methods can be given a detailed study.

Proposals for the collection and disposal of miscellaneous refuse were also opened March 20, and on May 3, 1918, contract was entered into with John G. Faircloth to do this work for a period of three years at prices believed to be advantageous to the District.

No contract for the collection of ashes and refuse from public buildings under the control of the commissioners has been entered into. Proposals were opened May 27 and June 17, but all proposals were rejected both times as no reasonable bids were secured.

The service rendered by the contractors for ash, garbage, and refuse service was not as satisfactory as in the past owing to the labor difficulties. These difficulties were such that it became necessary to institute supplementary service on miscellaneous refuse work on February 5 and on June 25, and on the ash work December 21. As a result of the difficulties experienced the complaints and the liquidated damages exceeded previous years.

MORRIS HACKER,
Supervisor, City Refuse.

Table showing comparative data in connection with street-cleaning work, 1914 to 1918.

SQUARE YARDS CLEANED.

	1914	1915	1916	1917	1918
Hand patrol	835,588,000	1,027,020,000	1,052,765,000	1,024,688,000	879,574,000
Machine sweeping	267,557,000	217,235,000	218,852,000	219,869,000	205,504,000
Alley cleaning	58,671,000	66,206,000	67,842,000	65,471,000	49,878,000
Suburban streets	34,296,000	43,549,000	50,127,000	58,940,000	38,393,000
Squeegeeing	144,878,000	167,754,000	187,794,000	169,566,000	125,520,000
Flushing	22,424,000	26,304,000	23,696,000	27,485,000	16,776,000
Motor flushing				6,135,000	12,621,000

DIRECT TOTAL COST.

Hand patrol	$116,921.65	$135,553.98	$138,571.03	$148,401.40	$165,521.33
Machine sweeping	41,756.07	32,378.12	31,405.83	37,583.20	49,242.68
Alley cleaning	19,795.31	21,914.70	22,155.20	24,221.64	30,018.51
Suburban streets	13,591.99	14,269.23	15,900.32	20,164.21	18,986.48
Squeegeeing	17,478.55	19,337.40	20,037.40	20,560.73	21,141.04
Flushing	5,210.98	5,099.30	5,033.32	7,829.54	7,566.84
Motor flushing				721.60	3,964.29

COST PER 1,000 SQUARE YARDS.

Hand patrol	$0.140	$0.132	$0.132	$0.145	$0.189
Machine sweeping	.156	.149	.144	.171	.239
Alley cleaning	.337	.331	.326	.371	.603
Squeegeeing	.121	.115	.106	.121	.168
Flushing	.232	.194	.212	.285	.450
Motor flushing					.314

Total cost of street cleaning, including all charges, except interest on investment and depreciation	$344,853.49
Population served (police census of 1917)	395,947
Cost per capita per year	$0.871

Table showing comparative data in connection with disposal of all city wastes from 1914 to 1918.

NUMBER OF UNITS COLLECTED.

	1914	1915	1916	1917	1918
Garbage.....tons..	48,927	50,806	52,207	44,683	48,874
Ashes.....cubic yards..	255,358	148,190	135,305	151,783	127,363
Miscellaneous refuse.....do....	140,683	146,152	157,180	149,810	163,291
Night soil.....barrels..	15,514	12,949	12,741	11,227	11,300
Dead animals.....number..	19,148	20,570	22,724	24,562	22,891

TOTAL NET COST.

	1914	1915	1916	1917	1918
Garbage	$68,384.00	$68,374.00	$69,788.00	$69,756.00	$69,290.00
Ashes	73,007.00	73,041.00	68,935.00	59,052.00	68,922.64
Miscellaneous refuse	16,583.50	16,609.00	28,187.00	27,954.25	26,318.75
Night soil	14,962.00	14,996.00	14,990.00	14,994.00	14,998.00
Dead animals	2,853.00	2,855.00	2,988.00	2,988.00	2,988.00

COST PER UNIT.

Garbage, per ton	$1.39	$1.34	$1.34	$1.56	$1.42
Ashes, per cubic yard	.29	.49	.51	.39	.54
Miscellaneous refuse, per cubic yard	.12	.11	.18	.19	.16
Night soil, per barrel	.96	1.16	1.17	1.33	1.33
Dead animals, each	.149	.14	.13	.12	.13

LIQUIDATED DAMAGES DEDUCTED.

Garbage	$16.00	$26.00	$52.00	$84.00	$550.00
Ashes	143.00	109.00	65.00	948.00	1,077.35
Miscellaneous refuse	416.50	391.00	213.00	445.75	2,081.25
Night soil	38.00	4.00	10.00	6.00	2.00
Dead animals	2.00				

NOTE.—The reduction in cubic yards of ashes collected as indicated for 1914 is in error. The amount collected during 1915 and 1916 is probably below the average because of the mild winter, but checks on the amount reported collected by the contractor during the summer of 1914 indicate that too large an amount had previously been reported.

NOTE.—The reduction in 1918 is probably due to the shortage and conservation of fuel.

The table herewith gives a comparison of the number of complaints investigated by this division during the past two years:

	Garbage.				Ashes.				Refuse.			
	1917	Per cent.	1918	Per cent.	1917	Per cent.	1918	Per cent.	1917	Per cent.	1918	Per cent.
Complaints:												
Fault of contractor	86	14	321	24	1,123	49	1,633	57	387	24	1,504	53
Fault of householder	200	32	510	38	514	23	803	28	512	32	575	20
Doubtful	339	54	497	38	627	28	412	15	704	44	751	27
Total complaints	625	100	1,328	100	2,264	100	2,848	100	1,603	100	2,830	100
Total requests	103	.....	157	.....	392	.....	237	.....	225	.....	223	.....
Grand total	728	.....	1,485	.....	2,656	.....	3,085	.....	1,828	.....	3,053	.....

Miscellaneous data on contracts let during the year.

Class of waste.	Contractor.	Period of contract.	Date of expiration.	Price per annum.	Collected from—
Ashes	J. W. Bean Contracting Co.	1 year...	June 30, 1919	$78,300	Residences, small boarding and lodging houses, small apartments.
Refuse	John G. Faircloth	3 years..	June 30, 1921	[1] 54,000 [2] 35,400 [3] 15,000	Do.
Dead animals	Chas. F. Mann	5 years..	June 30, 1923	3,360	Every part of the District.
Night soil	Warner Stutler	...do....	.....do.....	17,500	All privies in the District.

[1] First year. [2] Second year. [3] Third year.

REPORT OF THE INSPECTOR OF ASPHALTS AND CEMENTS.

WASHINGTON, D. C., *August 28, 1918.*

SIR: I have the honor to submit the following report showing the operations of this division during the fiscal year ending June 30, 1918:

There was a decrease in the total number of samples analyzed, tested, and examined during the year, 9,358 against 10,954 submitted during the year 1917. This was caused principally by the lack of work by contractors and District owing to the general war conditions and lack of procuring material.

ASPHALT BLOCK.

All blocks used by the District in the paving of avenues, streets, and alleys were manufactured by the Washington Asphalt Block & Tile Co., contractors, in which Trinidad and Texaco asphalts mixed in the proportion of 54 and 46 parts, respectively, were used.

ASPHALT PAVEMENTS.

During the year there were laid by the Cranford Paving Co., contractors for laying new asphalt pavements, approximately 93,051 square yards, in which Aztec asphalt was used.

The Warner-Quinlan Co., contractors for repaving and resurfacing asphalt pavements, laid about 50,414 square yards, using Montezuma asphalt.

The municipal asphalt plant produced about 6,415 cubic yards of asphalt concrete and topping, used in the patching and repairs to asphalt pavements in which Aztec and Standard asphalt were used.

PORTLAND CEMENTS.

Tested 8,060 samples, representing 80,600 barrels. Results of tests and by whom submitted are shown in accompanying tables.

During the year several pieces of apparatus have been purchased and designed by the division, such as electric furnace, automatic sand sifter and water still, special thermometers, etc.

All work has been kept current and is current to date.

Very respectfully,

J. O. HARGROVE
Inspector of Asphalts and Cements.

ASSISTANT TO THE ENGINEER COMMISSIONER.

Total number of samples tested.

Asphalts:	
Aztec	39
Lake Trinidad (refined)	3
Montezuma	14
Texaco	1

Asphalt mixtures:	
Binder	20
Cement (binder)	120
Cement (topping)	134
Cement (District of Columbia asphalt plant)	202
Topping mixtures	339
Concrete mixtures	14
Topping (old surface material)	8
Cement, Portland	8,060
Oils:	
Flux	1
Fuel	1
Road	10
Pitch, paving	1
Sands	103
Stone:	
Binder	89
Limestone dust	34
Trap-rock screenings	5
Limestone screenings	3
Miscellaneous	157
Total	9,358

ASPHALTS.

Chemical and physical examination of asphalts used in laying and repairing of pavements in the District of Columbia shown in the following tables:

From Cranford Paving Co. (37 samples Aztec, refined, representing 1,100 tons):

Penetration at 77° F		53
Bitumen soluble in CS_2	per cent	99.81
Organic matter insoluble	do	.11
Ash	do	.13
Ductility at 77° F	centimeter	89
Penetration before heating		53
Penetration after heating 300° F., 7 hours		47
Asphalt cement hardens	per cent	11.28
Asphalt cement loses	do	.11

From municipal asphalt plant (2 samples Aztec, refined, representing 40.79 tons; 10 samples Standard, refined, representing 389 tons).

		Aztec.	Standard.
Penetration at 77° F		46	59
Bitumen soluble in CS_2	per cent	99.82	99.79
Organic matter insoluble	do	.07	.05
Ash	do	.11	.17
Ductility at 77° F	centimeter	100	95
Penetration before heating		46	59
Penetration after heating 300° F., 7 hours		43	50
Asphalt cement hardens	per cent	6.52	15.33
Asphalt cement loses	do	.0	.07
Flash	°F	525	488
Burns	do	600	600

The Warner-Quinlan Asphalt Co. (14 samples Montezuma, refined, representing 505 tons):

Penetration at 77° F		54
Bitumen soluble in CS_2	per cent	99.83
Organic matter insoluble	do	.10
Ash	do	.14
Ductility at 77° F		94
Penetration before heating		54
Penetration after heating 300° F., 7 hours		49
Asphalt cement hardens	per cent	10.31
Asphalt cement loses	do	1.74

ASPHALT FLUX.

One sample was submitted by the Cranford Paving Co., representing 60,000 pounds, manufactured by the United States Asphalt Refining Co., and one sample, which was the product of the Warner-Quinlan Asphalt Co., representing 20,000 pounds, all of which passed the requirements of the specifications.

ASPHALT CEMENT.

Table showing penetration at 77° F., results of asphalt cement used in asphalt binder, concrete, and topping used by the contractors and municipal asphalt plant:

	Cranford Paving Co. (Aztec).		Municipal asphalt plant.		Warner-Quinlan Asphalt Co. (Montezuma).	
	Binder.	Topping.	Aztec.	Standard.	Binder.	Topping.
Number of samples	68	74	53	149	52	60
Highest test—						
Office	63	62	59	70	60	60
Yard	60	60	.....	.....	57	57
Lowest test—						
Office	50	50	48	49	48	48
Yard	51	51	.....	.....	48	48
Average of all samples tested—						
Office	55	55	53	57	53	53
Yard	54	57	.....	.....	52	52

BINDER STONE.

During the year there were examined 89 samples of binder stone used in the laying and making repairs to asphalt pavements, representing 6,666 cubic yards with no rejections:

	Samples received.	
	Number.	Cubic yards.
Cranford Paving Co	32	3,680
Warner-Quinlan Co	57	2,986

ASPHALT BINDER MIXTURE.

Analysis of 4 samples taken from the Cranford Paving Co. and 16 samples taken from the Warner-Quinlan Co. showed an average of bitumen soluble in carbon bisulphide, as follows:

	Number of samples.	Bitumen soluble in carbon bisulphide.
		Per cent.
Cranford Paving Co	4	4.1
Warner-Quinlan Co	16	3.3

SAND USED IN SURFACE MIXTURE.

Of this material 78 samples representing 11,158 cubic yards were inspected, of which 645 cubic yards were rejected on account of coarseness and excessive percentage of mud.

	Number of samples.	Cubic yards accepted.	Cubic yards rejected.
Cranford Paving Co	36	5,280	480
Municipal Asphalt Plant	25	2,675	.....
Warner-Quinlan Co	17	2,558	165

LIMESTONE DUST USED IN SURFACE MIXTURE.

This material is used as a filler to reduce the void in the sand used in asphalt surface mixtures and crushed stone in block mixtures. During the year there were examined 34 samples, all of which passed the required degree of fineness; i. e., all to pass the 30 and not less than 85 per cent to pass the 100-mesh sieve.

	Samples.	Tons.
Cranford Paving Co	10	250
Municipal Asphalt Plant	8	240
Warner-Quinlan Co	10	250
Washington Asphalt Block & Tile Co	6	150

ASPHALT TOPPING MIXTURES.

During the year there were 339 samples collected from the Cranford Paving Co., municipal asphalt plant, and Warner-Quinlan Co. for examination and analysis. The following tables show the maximum, minimum, and average per cent bitumen contained and the average mesh composition of mineral aggregate used:

	Number of samples.	Per cent bitumen.		
		Highest.	Lowest.	Average.
Cranford Paving Co., Aztec	73	12.8	10.2	11.3

Mesh composition of aggregate used in mixture.

Retained on sieves having—	Per cent.
20-mesh per linear inch	5.9
40-mesh per linear inch	25.9
60-mesh per linear inch	27.2
80-mesh per linear inch	15.0
100-mesh per linear inch	8.0
Passing 100-mesh per linear inch	18.0

	Number of samples.	Per cent bitumen.		
		Highest.	Lowest.	Average.
Municipal Asphalt Plant:				
Aztec	53	11.0	8.2	9.6
Standard	149	11.9	6.7	9.7

Mesh composition of aggregate used in mixture.

Retained on sieve having—	Per cent.
¼-inch mesh	3.4
8-mesh per linear inch	9.0
10-mesh per linear inch	2.2
20-mesh per linear inch	7.7
40-mesh per linear inch	24.6
60-mesh per linear inch	24.0
80-mesh per linear inch	9.4
100-mesh per linear inch	5.6
Passing 100-mesh per linear inch	14.1

	Number of samples.	Per cent bitumen.		
		Highest.	Lowest.	Average.
Warner-Quinlan Co., Montezuma	64	11.6	9.6	10.7

Mesh composition of aggregate used in mixture.

Retained on sieves having—	Per cent.
20-mesh per linear inch	5.1
40-mesh per linear inch	23.6
60-mesh per linear inch	26.3
80-mesh per linear inch	14.6
100-mesh per linear inch	7.9
Passing 100-mesh per linear inch	22.5

ASPHALT SURFACE MIXTURE (ASPHALT CONCRETE), MUNICIPAL ASPHALT PLANT.

During the year there were examined 14 samples of asphalt concrete, representing about 817 cubic yards. This material was a mixture composed of trap-rock screenings 45 per cent, building sand 44 per cent, limestone dust 4 per cent, and asphalt cement 7 per cent, penetration at 77° F., 100-grams, 5-seconds 50. The average mesh composition of this mineral aggregate is shown in the table below. The stone, sand, and limestone dust were heated to a temperature of about 350° F., in the heating drum of a Warren portable asphalt mixer. The hot asphalt was added and the whole thoroughly mixed for about 5 minutes; it was then discharged into carts and hauled to the site of work which consisted principally of repairs to asphalt pavements. Examination of the material produced showed an average of bitumen soluble in carbon bisulphide of 8.1 per cent.

Mineral aggregate mesh composition.

Retained on—	Per cent.
½-inch mesh	2.5
¼-inch mesh	7.2
8-mesh per linear inch	14.6
10-mesh per linear inch	3.5
20-mesh per linear inch	12.1
40-mesh per linear inch	22.1
60-mesh per linear inch	20.2
80-mesh per linear inch	5.5
100-mesh per linear inch	3.6
Passing 100-mesh per linear inch	8.7

ASPHALT SURFACE MIXTURE TOPPING MUNICIPAL ASPHALT PLANT.

There were examined 202 samples of topping mixture representing about 5,598 cubic yards. This material was a mixture composed of old asphalt surface mixture (topping and binder) which after being removed from the street was hauled to the municipal plant and crushed in a Noyes rotary crusher to a fineness ranging from 1 inch to dust; to this material were then added trap-rock screenings, fine sand, limestone dust, and asphalt cement, about the following proportions: Old asphalt surface material 60 per cent, fine sand 34 per cent, limestone dust 2 per cent, and asphalt cement 4 per cent, penetration at 77° F., 5 seconds, 100 grams 56. The whole being mixed as above described under asphalt concrete and used for the same purpose. Examination of this material showed an average of bitumen soluble in carbon bisulphide of 9.7 per cent.

Topping mixture after production.

	Per cent.
Bitumen soluble in carbon bisulphide	9.7

Mesh composition mineral aggregate.

Retained on—	Per cent.
¾-inch mesh	3.3
½-inch mesh	6.2
¼-inch mesh	20.1
8 mesh per linear inch	12.9
10 mesh per linear inch	2.0
20 mesh per linear inch	4.3
40 mesh per linear inch	13.7
60 mesh per linear inch	15.2
80 mesh per linear inch	5.8
100 mesh per linear inch	4.2
Passing 100 mesh per linear inch	12.3

ASPHALT BLOCK.

About 393,034 paving blocks, manufactured by the Washington Asphalt Block & Tile Co., were used in the paving of avenues, streets, and alleys in this city during the year, in the manufacture of which there was used Trinidad Lake asphalt fluxed with petroleum residuum and Trinidad Lake asphalt 54 parts, Texaco 46 parts fluxed with petroleum residuum, and a mineral aggregate composed of trap rock, limestone screenings, and limestone dust.

ASPHALT CEMENT.

	Lake Trinidad and Texaco.
Bitumen soluble in carbon bisulphide.....per cent..	83.49
Penetration at 77° F., 100-grams.....	23
Per cent of hardening after heating 300° F., 7 hours.....per cent..	7.68
Per cent of loss after heating 300° F., 7 hours.....do....	.14
Brittleness in centimeters drop of 25-gram weight at 32° F.....do....	12.5

BLOCK.

Specific gravity.....	2.477
Bitumen soluble in carbon bisulphide.....per cent..	7.2
Mesh composition of mineral agrgegate:	Per cent.
Retained on ¼-inch mesh sieve.....	1.0
Retained on 20 mesh per linear inch.....	54.6
Retained on 100 mesh per linear inch.....	19.8
Passing 100 mesh per linear inch.....	24.6

HYDRAULIC CEMENTS.

Number of barrels inspected and the average results of tests on same—Portland cement.

	Atlas.	Nazareth.	Saylor's.	Security.	Tidewater.	Vulcanite.
Number of barrels.....	693	40,760	1,962	5,458	19,035	12,710
Number of samples.....	69	4,076	196	545	1,903	1,271
Fineness passing 100-mesh sieve..per cent..	97.0	98.5	97.7	96.8	96.7	96.6
Fineness passing 200-mesh sieve.....do....	79.6	87.0	86.4	82.4	83.9	82.7
Initial set (hours and minutes).....	3-50	4-20	5-30	3-35	3-35	5-05
Hard set (hours and minutes).....	5-40	6-25	7-15	5-05	4-50	6-40
Per cent water used:						
Neat cement.....	23.0	24.0	23.0	23.0	23.0	22.5
3 parts Ottawa sand.....	.....	.....	10.3	10.1	10.3	10.2
Temperature of air and water.....	78	76	76	78	83	79
Tensile strength in pounds, per square inch:						
Neat—						
1-day.....	448	390	289	386	433	334
7-day.....	.....	.....	696	640	707	712
Sand (1.3)—						
7-day.....	.....	.....	271	237	307	287
28-day.....	.....	.....	.....	.....	396	.....
Specific gravity.....	3.179	3.157	3.165	3.159	3.205	3.195

In the testing of cement, samples are taken from 10 barrels of each 100-barrel lot and tested individually. The 8,060 samples represent 80,618 barrels, with no rejections.

Number of barrels of cement tested and by whom submitted.

Cranford Paving Co., Vulcanite		12,710
District of Columbia:		
Nazareth	40,760	
Tidewater	17,870	
		58,630
Murray, W. D. (canal wall), Tidewater		565
Warner-Quinlan Co., Security		4,420
Washington Asphalt Block & Tile Co.:		
Security	1,038	
Saylors	1,962	
Tidewater	600	
		3,600
Bennings Viaduct, Atlas		693
Total		80,618

REPORT OF THE SURVEYOR.

WASHINGTON, D. C., *September 25, 1918.*

SIR: I have the honor to submit the following report concerning the work of this office, including the extension of streets and avenues and alley condemnations, for the fiscal year ended June 30, 1918:

PRIVATE SURVEYS, OR SURVEYS FOR WHICH A FEE IS CHARGED.

During the past year this character of work, while not so voluminous as it has been during previous years, has been sufficient to keep the working force of the office fairly busy. Under this head is included all work for which fees are charged, it being necessary according to law that this work be done by the surveyor.

The total amount of money collected for this work was $9,565.15, which is a decrease as compared with the amount collected during the previous year. The reason of this decrease is of course due to the great decrease in building operations resulting from the high cost of labor and materials, a condition which is well known to exist throughout the entire country.

The number of individual orders left for work was 2,200 against 3,222 for the previous year, while the number of lots, or parcels of lots or land, surveyed was 2,576 against 1,889 for the previous year, which is a substantial increase. The work generally, however, showed a marked decrease as compared to that for previous years owing to the abnormal conditions existing incident to war preparations and activities; but to offset this decrease in work the office force has decreased to a great extent on account of employees leaving the force for higher salaries elsewhere, and it is impossible to fill their places with competent men.

SURVEYS FOR THE FEDERAL AND DISTRICT GOVERNMENTS.

This office is frequently called upon during the year to make surveys for the Federal and District Governments, and while no fee is charged for this work, it is generally of a difficult character and entails more work, and hence a longer time is consumed in its performance than is taken for private work.

The total cost of this public work for the past year was $5,970. This is figured as nearly as possible on the same basis that private work is paid for.

In addition to a great amount of work under this head performed for the various departments of the District Government, such as surveying street and alley lines, school sites, lots and parcels of land for the assessor upon which to base assessments, etc., much work was also performed for the Federal Government, mostly in connection with war activities, such as surveys to show radius distances from military camps, surveys of tracts of land for new Government departments, and land adjoining old Government departments to provide for their expansion.

The table following is submitted as a matter of comparison and convenience. It will show the relation of the work for the past year with that of the previous year.

	Fiscal year 1916–17.	Fiscal year 1917–18.
FOR PRIVATE PARTIES.		
Individual lots or parts of lots surveyed in city and county	1,889	2,576
Certificates of survey issued covering one or more lots	1,096	718
Duplicates of above recorded in survey certificate books	1,096	718
Separate surveys made to verify walls	844	518
Postal card reports concerning walls to owners	844	518
Individual buildings inspected as to location of new walls	1,564	1,060
Large tracts in county surveyed, subdivided, and recorded	7	6
Outline surveys in county of unsubdivided tracts	20	39
Subdivision plats prepared in duplicate	271	172
Duplicate subdivisions prepared for assessor	271	172
Subdivisions recorded	247	168
Total of individual new lots in subdivisions	2,397	2,262
Plats of one or more recorded lots to accompany applications for building permits (commonly called "building plats") in duplicate	990	701
Plats made under regulations for theaters, stables, motors, etc	289	214
Estimates of cost issued in triplicate	3,222	2,200
Plats made up on order of private parties	2,673	1,850
Total of fees paid to collector of taxes by private parties	$14,193.32	$9,565.15
FOR THE DISTRICT OF COLUMBIA.		
Surveys for the District of Columbia	185	91
Plats recorded (condemnations, dedications, etc.)	42	56
Reports concerning walls to building inspector	806	533
Assessment and taxation plats recorded	219	130
MISCELLANEOUS.		
Total of surveys for the District of Columbia and private parties	2,114	1,372
Total of plats, public and private, including plats drawn in books	4,938	3,315

STREET EXTENSIONS.

This class of work relates to the opening, widening, and straightening of streets and alleys by condemnation and the changing of the street-extension plan in certain sections when deemed necessary or advisable, according to the procedure prescribed by law.

In all condemnation cases plats and descriptions of the land to be condemned have to be prepared by this office to be filed with the petitions in court. After proper advertisement in accordance with law a jury is convened in court and hears evidence in the case in order to properly award damages for the property to be taken and to assess benefits against the property benefited to cover the cost of the land and court proceedings.

There has recently been some difficulty as to the proper method to pursue after the jury determines these damages and benefits. Descriptions of the land condemned and that found to be benefited must again be compiled and typewritten, and some objection has been made to the jury securing competent help for this purpose, on the ground that their findings should be secret until filed. But it has been extremely difficult for them to draw up this data, as the same requires expert engineering knowledge as to courses and distances, land designations, etc., and the services of a competent typewriter. It is thought that this should be done by the surveyor's office, possibly, if desired, by some employee who can act as confidential clerk to the jury in assisting in compiling this data. Until some law is passed or some ruling by the court to permit this practice condemnation cases will be greatly delayed, and in some cases liable to be set aside entirely, and it is earnestly recommended that the commissioners recommend the passage of some law to cover this matter and relieve this difficulty.

During the past year 11 condemnation cases of streets and alleys were confirmed, and there are now pending in court 20 cases.

The amount of damages awarded in the cases confirmed was $45,907.54. This amount was, of course, distributed as benefits in accordance with law.

Among the important cases filed during the year, but not yet disposed of, are the opening, widening, and extension of Concord Avenue, Ingraham Street, Riggs Road, Kennedy Street, and Longfellow Street; the opening of Webster and Allison Streets between Arkansas Avenue and Fourteenth Street, and Arkansas Avenue between Thirteenth and Sixteenth Streets; and the extension of Fessenden Street between Reno and Belt Roads.

The following table shows the status of each case now in court and those confirmed or otherwise disposed of during the past year:

Condemnation cases.

STREET EXTENSIONS AND PARKS.

Location.	Court docket No.	Act No.	Act approved.	Case filed.	Verdict filed.	Verdict.		Remarks.
						Damages.	Benefits.	
Road and park along Anacostia River	1049	170	May 10, 1910	Nov. 27, 1912				Jan. 6, 1914, order dismissing current proceedings; Apr. 15, 1915, mandate court of appeals reversed with costs.
Widening Benning Road west of Anacostia River.	1107	.....	.....	Apr. 21, 1914	.....	.....	.....	Cause entered dismissed by attorney for petitioners June 13, 1917.
Cathedral Avenue and Woodley Road	1239	.....	.....	Apr. 20, 1915	.....	.....	.....	Continued from Apr. 9, 1916.
Central Avenue between Rhode Island Avenue and Brentwood Road.	1247	.....	.....	Aug. 6, 1915	Mar. 30, 1916	$2,699.04	$3,178.14	Objections to verdict sustained; new verdict confirmed May 15, 1918.
Wisconsin Avenue between Garfield Street and District line.	1263	.....	.....	Feb. 4, 1916	Sept. 25, 1917	.....	.....	Nov. 26, 1917, motion of commissioners to confirm verdict.
Porter Street, squares 3515 and 3516	1268	.....	.....	Feb. 28, 1916	.....	.....	.....	Oct. 13, 1917, case dismissed by attorneys for District of Columbia.
First Street NE. between Florida Avenue and Q Street; V Street NW. between Flagler Place and Second Street.	1269	.....	.....	..... do	July 19, 1917	13,704.58	14,204.71	Verdict confirmed Oct. 11, 1917; case dismissed as to First Street by attorneys for District of Columbia, Oct. 13, 1917.
Building-restriction line, Park Road and Mount Pleasant Street, square 2612.	1277	.....	.....	May 9, 1916	Mar. 4, 1918	.....	.....	July 11, 1918, motion of District of Columbia to confirm verdict.
Building-restriction line, Columbia Road, square 2536.	1279	.....	.....	Sept. 27, 1916	.....	.....	.....	
Seventeenth Street NW., Irving Street to Kenyon Street.	1281	250	Sept. 1, 1916	Nov. 22, 1916	June 8, 1917	8,640.45	9,107.69	July 18, 1917, verdict confirmed.
Park, square 1726	1287	.....	.....	..... do	Jan. 21, 1917	2,710.26	1,536.48	Do.
Kenyon Street NW., Seventeenth Street to Mount Pleasant Street.	1288	250	Sept. 1, 1916	Nov. 28, 1916	Jan. 25, 1918	.....	.....	Verdict not yet confirmed.
Rhode Island Avenue, South Dakota Avenue to the District line.	1293	.....	.....	Mar. 16, 1917	Aug. 1, 1917	5,611.92	6,127.88	Sept. 10, 1917, verdict confirmed.
Shannon Place SE., square 5772	1294	.....	.....	Mar. 13, 1917	.....	.....	.....	Continued to Oct. 14, 1918.
Oak Street NW., from present terminus to Fourteenth Street.	1295	.....	.....	..... do	Jan. 25, 1918	4,127.00	4,500.20	May 15, 1918, verdict confirmed.
Widening Benning Road west of Anacostia River.	1296	.....	.....	Mar. 26, 1917	.....	.....	.....	Hearing continued from Apr. 3, 1918; verdict not yet filed.
Highway and park along Anacostia River, parcels 211/4 and 211/7.	1297	.....	.....	..... do	.....	.....	.....	Continued from Apr. 12, 1917; verdict not yet filed.
Building-restriction line, Newton Street N.W., between Sixteenth and Seventeenth Streets.	1303	.....	.....	Apr. 14, 1917	.....	.....	.....	
Minor Street in Keating estate, squares 3526 and 3530.	1305	.....	.....	May 14, 1917	Jan. 25, 1918	4,187.00	4,541.70	May 15, 1918, verdict confirmed.

Condemnation cases—Continued.

STREET EXTENSIONS AND PARKS—Continued.

Location.	Court docket No.	Act No.	Act approved.	Case filed.	Verdict filed.	Verdict.		Remarks.
						Damages.	Benefits.	
Concord Avenue, between Fifth Street and New Hampshire Avenue; Ingraham Street, between North Capitol Street and New Hampshire Avenue; Riggs Road, east of North Capitol Street; Kennedy Street, between Second Street and Concord Avenue; Longfellow Street, between Third Street and Concord Avenue.	1311	.....	.....	Sept. 29, 1917	July 12, 1918	.....	.....	Not yet confirmed; Aug. 2, 1918, order dismissing petition of District of Columbia as to Ingraham Street
Fifth Street NE., W Street to Rhode Island Avenue.	1312	.....	.....	Nov. 12, 1917	Apr. 27, 1918	.....	.....	Not yet confirmed.
Webster and Allison Streets, between Arkansas Avenue and Fourteenth Street; Arkansas Avenue, between Thirteenth and Sixteenth Streets.	1314	.....	.....	Jan. 30, 1918	.....	.....	.....	Continued to Oct. 14, 1918.
Forty-sixth Street, between Van Ness Street and Massachusetts Avenue.	1315	.....	.....	..... do	.....	.....	.....	Do.
South Dakota Avenue, from Vista Street to Bladensburg Road; Vista Street, from Franklin Street to South Dakota Avenue; Thirtieth Street, from Franklin Street to South Dakota Avenue.	1316	.....	.....	..... do	June 13, 1918	.....	.....	Not yet confirmed.
Montana Avenue NE., between Rhode Island Avenue and Bryan Street.	1317	.....	.....	..... do	.....	.....	.....	Continued to Oct. 14, 1918.
Fessenden Street NW., between Reno Road and Belt Road.	1318	.....	.....	..... do	.....	.....	.....	
Thirty-ninth Street NW., between Northampton Street and Chevy Chase Circle.	1326	.....	.....	May 29, 1918	.....	.....	.....	

ALLEYS.

Location.	Court docket No.	Case filed.	Verdict filed.	Verdict.		Remarks.
				Damages.	Benefits.	
Square 3055	1284	Nov. 22, 1916	June 21, 1917	$48.48	$371.64	Verdict confirmed Oct. 11, 1917.
Square 3051	1285	....do.....	May 31, 1917	1,613.55	2,014.47	Verdict confirmed July 18, 1917.
Square 2571	1286	....do.....				Not yet confirmed.
Square 2895	1290	Mar. 1, 1917	July 19, 1917	1,797.71	2,253.05	Verdict confirmed Oct. 11, 1917.
Square 674						
Square 3120	1290	....do.....				Oct. 13, 1917: cause dismissed as to this square.
Square 2718	1306	June 12, 1917	Apr. 13, 1918	767.55	1,003.13	Verdict confirmed June 13, 1918.
Squares 2831, 2842, 2685, and 3055, widening alleys	1323	May 28, 1918				
Squares 3572 and 3872	1327	May 29, 1918				

PARKS.

During the past year the park question has somewhat laid dormant on account of pressing governmental activities in other matters; but there are few projects or enterprises which tend more to promote the health and happiness of the inhabitants of a large city than accessible parks. Particularly is this so at the present time when the city is filled with people from all parts of the country engaged in war work or enterprises directly resulting from the world conflict of nations. It is essential that these people be provided with reservations where they can find rest and recreation, and it is earnestly hoped that the park cases now pending will be pushed to a conclusion and the important cases under consideration will be favorably acted upon by the commissioners.

There is at present no law to permit the purchase or condemnation of land for park purposes without a specific act of Congress, and before such an act is passed it frequently happens that the property most suitable for a park is built upon, thereby preventing its acquisition entirely, or rendering its condemnation so expensive that it is impossible for the jury to find benefits sufficient to justify the condemnation.

It is thought that a general appropriation for the acquisition of small parks should be made, the act also giving the commissioners authority to make selections of property in their judgment best suited for the purpose.

During the past year square 1726, bounded by Nebraska Avenue, Van Ness and Forty-first Streets, was acquired for a small park. The acquisition also of land in squares 1483, west of 1556, north of 3376 and 3340, has been recommended for park purposes, but the petitions have not yet been filed.

ALLEYS.

During the year four alley condemnation cases were confirmed. There are three cases still on the court docket to be disposed of, but these cases include alley extensions in a number of squares, as in many cases several squares are grouped in one proceeding for convenience and also to save the expenses of separate proceedings.

The appropriation of $1,000 for the acquisition of land for alleys has been put to good use. Many dangerous corners at alley intersections have been eliminated by the purchase of small parcels of land out of this appropriation for alley cut-offs. At the present day when there are so many garages being built fronting on narrow alleys, and a great number of automobiles passing in and out, the purchase of these cut-offs is of inestimable benefit.

It is recommended that this appropriation be continued.

The office force has during the past year cheerfully given its help to matters connected with the selective draft coming under exemption board No. 4, of which the surveyor is chairman. While this work has been willingly done, taking a great deal of the time of the surveyor as well as some of the employees, it has somewhat retarded the current work. The office work, however, has been efficiently performed by the employees, and the office is fortunate in having still on its rolls a capable force to perform this essential and scientific engineering work.

Very respectfully,

M. C. HAZEN,
Surveyor, District of Columbia.

ASSISTANT TO THE ENGINEER COMMISSIONER.

REPORT OF THE SUPERINTENDENT OF TREES AND PARKINGS.

WASHINGTON, D. C., *August 20, 1918.*

SIR: I have the honor to submit my second annual report dealing with the operations of the trees and parkings office for the fiscal year ended June 30, 1918.

TREES PLANTED, REMOVED, AND SPRAYED.

It has been the practice of this office in the past to transplant young trees to their permanent positions on the streets as rapidly as the surface conditions justified the undertaking of the work, and also to replace trees in the vacant spaces in the established lines. This work could not be undertaken very extensively during the fiscal year 1918, due to the scarcity of labor, and as a result there are many improved streets where trees should be planted. Our efforts during the year resulted in the transplanting of 1,500 young trees to their permanent position on the streets. Of the number planted, 1,494 were set at the curb line, 5 in the parking between the inner edge of the sidewalk and the building line, and 1 in the center parking on Fourteenth Street NW., north of Montague Street. A decrease of 992 trees is noted in this work as against last year's record, which was 2,492 trees; 1,078 trees were set out during the fall planting season and only 422 during the spring. The past winter was un-

usually severe and very little work was performed, and no tree holes were prepared for the spring planting. The number of trees planted the past spring was unusually small, due to the fact that many of our old employees had obtained other employment.

During the year 1,887 trees were removed for various reasons. There was a decrease of 234 trees over the number removed the previous year. Careful consideration is always given to the requests for the removal of live trees, and many growths are saved each year by suggested changes in the locations of driveways, vaults, etc. During the year 1 sugar maple, 1 silver maple, and 114 honey-locust trees were removed from both sides of E Street SE., between Sixth Street and Pennsylvania Avenue, and replaced with 67 pin oaks; also 52 Carolina poplar trees were removed from both sides of I Street NE., between Twelfth Street and Florida Avenue, and replaced with 44 sycamores, i. e., oriental plane trees; and 9 sycamore trees were removed on the north side of I Street NE., between Eleventh and Twelfth Streets, and replaced with 8 sycamores; 18 silver maples were removed from the east side of Nineteenth Street NW., between E and F Streets, and replaced with 10 Norway maples; 8 silver maples, 6 Norway maples, and 3 sugar maples were removed from the south side of F Street NW., between Eighteenth and Nineteenth Streets, and replaced with 9 Norway maples. Because of street improvements it was necessary to remove 31 Norway-maple trees on both sides of Thirteenth Street NW., between E and F Streets, and replant 13 Norway maples at this location; also 38 sycamore trees were removed from both sides of Twelfth Street NW., between G Street and New York Avenue, and replaced with 26 sycamores.

Spraying operations were in progress at the beginning of the fiscal year and were continued up to July 17, 1917. The spraying of the city trees has become an annual necessity, and operations were again resumed on May 8 last and continued up to the close of the fiscal year.

The following statement shows the number and varieties of trees planted, removed, and sprayed during the year:

Variety.	Planted.	Removed.	Sprayed.
Ailanthus		9	
Ash		7	24
Beech		1	
Catalpa		5	
Cedar		2	
Cherry		2	
Cherry, wild		1	
Chestnut		1	
Chestnut, horse			208
Elm	78	53	11,907
Gingko	17	22	
Gum, sweet		11	44
Kentucky coffee		1	
Linden	42	73	6,533
Locust:			
Honey		131	17
Yellow		10	
Maple:			
Norway	500	318	8,964
Red		8	
Silver	3	241	6,503
Sugar	88	120	1,068
Sycamore		2	
Mulberry		8	5
Negundo		10	122
Oak:			
Pin	208	80	4,256
Red	220	232	532
Spanish		2	
White		5	
Willow leaf	26	30	
Osage orange		1	
Peach		1	
Pine		2	
Pine, spruce		24	
Plum		1	
Poplar:			
Aspen		5	
Athenian		13	
Carolina		116	11
Lombardy		1	
Tulip		22	302
Sugar nut		1	
Spruce, Norway		1	
Sycamore, i. e., oriental plane	318	314	6,077
Total	1,500	1,887	46,573

The planting, removal, and spraying of the above trees was paid for as designated below:

	Streets, District of Columbia, 1918, parking commission.	Appropriations for other departments.	Whole cost deposits.
Planting	1,396	89	15
Removing	1,577	271	39
Spraying	46,573		

Of the 1,887 trees removed during the year, 1,226 were dead, decayed, and dangerous, 142 were of inferior and condemned varieties; 24 to relieve excessive shade; 278 because of street improvements; 24 for driveways; 6 because of interference with building operations; 3, improvements of alleys; 40, accidents; 98, storms; 14, injurious to trees at the curb line; 7, injurious to private property; 20, close proximity to buildings; 3, street-car extension; and 2, to allow the construction of vaults.

It was ascertained that 42 trees were destroyed by illuminating gas, 25 by salt water, 147 by abnormal moisture supply, 7 by being girdled, 19 by being filled around, 1 by drought, 18 by scale, borers, sycamore louse, etc., and the deaths of 867 were unexplained.

One thousand seven hundred and fifty-six trees of the number removed stood as the curb line, 114 in the parkings, 11 in the sidewalk, 2 in the roadways, 2 in alleys, and 2 in school yards.

NURSERIES.

The nurseries located on Reservation No. 13, in the Washington Asylum grounds, and at the intersection of Iowa Avenue and Webster Street NW. are well stocked with trees of all varieties considered best for street planting. No seedlings were transferred to the nursery rows in the Washington Asylum grounds. This work was confined to the nursery at the intersection of Iowa Avenue and Webster Street NW. The total number of seedlings transferred from the seed beds to the nursery rows was 15,069, and of this number 3,450 were Norway maples, 984 were sycamore maples, 35 sugar maples, 1,469 were willow leaf oaks, 1,341 were red oaks, 6,714 were pin oaks, 600 were gingkos, and 476 were American lindens. In addition to these seedlings 1,000 Norway maples were purchased from an out-of-town nursery and planted in the nursery rows.

During the year, 2,613 pin oaks, 1,527 red oaks, 3,253 Norway maples, and 829 sycamore maple trees in the nursery rows were lime washed for the destruction of the scale insect.

TRIMMING.

No systematic trimming was undertaken during the year, but to offset this a great many individual requests for trimming trees, removing objectionable limbs, etc., were complied with. In executing orders for work of this nature in compliance with requests many trees in the immediate vicinity were trimmed. There is a great amount of trimming necessary at this time but due to the scarcity of skilled labor it is impossible to undertake this work very extensively. The severe trimming, topping off, would be very beneficial to many of the old trees throughout the city provided it could be undertaken. A total of 36,155 trees were trimmed during the year; this is an increase of 2,612 trees over the number trimmed the previous year.

TREE SURGERY.

During the year this department gave considerable attention to the treating of cavities in the trunks and limbs of trees. Any neglected injury to a tree in which the bark is stripped from the trunk, causes the wood to rot and the decay is carried to the center of the tree. Frequently such cavities can be treated and the life of the tree prolonged. The repair of tree cavities is very much like the process of filling a tooth. All decayed and diseased wood is removed as far as the living tissue. It is found that in old cavities, the bark, in an effort to cover up the wound, is deposited in thick rolls around the edges that turn inwardly. It is necessary to remove all this tissue to such parts of the trunk that belong to the natural contour of the tree. When the hollow

trunks of trees are filled with cement, they are immensely strengthened and are not in any danger of being overthrown by strong winds as trees of which the trunks are hollowed shells. The concrete acts as a pillar which reenforces the tree. Equally as serious and more numerous than wounds on trunks of trees are knot holes caused by decay of stumps. In these cases, the grain of the wood running toward the center of the tree instead of vertically, the decay is more easily carried to the heart. These knot holes have to be treated otherwise decay will gradually reach the heart of the tree. Five hundred and sixty-four trees were treated, this being an increase of 123 trees over last year's record. The following shows the location, kind, and number of trees cemented:

Kind.	Curb.	Parkings.
Elm	32	
Linden	222	170
Maple:		
Norway	1	
Silver	7	
Oak:		
Pin	1	
Red	1	
White		1
Sycamore, i. e., oriental planes	126	
Poplar, Carolina	3	
Total	393	171

NOTE.—The cost of treating the three Carolina poplar trees was paid for by a private individual, and the remaining ones were paid from the appropriation for the parking commission.

CULTIVATING YOUNG TREES, MOWING PARKINGS, AND REMOVING TREE BOXES.

It is generally found in cities that it is not the deficiency of the nutritive elements in the soil that causes the decline of trees, but rather the physical condition of the soil which renders it impossible for trees to perform their normal functions. The keeping of the soil around trees cultivated and free from weeds is one of the most important aids to their growth. The keeping of the ground loose allows air to reach the roots, renders more available the plant food the soil contains, and prevents the rapid evaporation of moisture. If the ground is hard it becomes heated, the water forces itself to the surface, and passes into the atmosphere. If kept cultivated it acts like a blanket, and prevents the loss of water by surface evaporation. Too much stress can not be laid upon the importance of cultivation, the full value of which is not generally appreciated. When there is no water available, trees can frequently be brought through in good condition during a period of drought by just keeping the soil dug up and loose around the base. The usual amount of cultivating young trees was undertaken during the year. Special attention was given in the spring to the lowering of the dirt and cultivation of all young trees planted during the fall and spring planting seasons.

In connection with the cultivation of young trees on the streets all weeds and undergrowth were removed from the public parkings abutting unimproved private property. Many requests are received each year for this work.

Three thousand one hundred and seventy-one wooden boxes and 79 iron guards were removed from the trees during the year.

REGULATION OF TERRACES.

The regulation of terraces throughout the city is proceeding satisfactorily. The builders have been complying with their permits as to the proper treatment of the parking. This office examined and issued 232 permits affecting the parking during the year. There has been a decrease in this work.

PAVING OF ABANDONED TREE SPACES.

The work of paving abandoned tree spaces throughout the city during the year was performed by the surface division, and the cost of the work paid from the appropriation for the parking commission. A total of $766.90 was spent on this work.

SUMMARY.

Curb trees on streets at close of fiscal year 1917	104,879
Net decrease of curb trees during the fiscal year 1918	262
Curb trees on streets at close of fiscal year 1918	104,617
Mileage of trees at close of fiscal year 1917	595.90
Decrease of mileage of trees, fiscal year 1918	1.48
Mileage of trees at close of fiscal year 1918	594.42
Mileage of tree-planted streets at close of fiscal year 1717	297.95
Decrease of mileage of tree-planted streets at close of fiscal year 1918	.74
Mileage of tree-planted streets at close of fiscal year 1918	297.21

NOTE.—Mileage is figured on the basis of 352 trees to the mile.

Expenditures, streets, District of Columbia, 1918, parking commission.

Labor:	
Clerical work	$2,044.63
Cultivated young trees planted on the streets	994.42
Filling low tree spaces	103.77
Improvement, care, and mowing of parkings	3,173.91
Maintenance of nurseries and shops	4,844.97
Maintenance of yard (including improvements and repairs, shoeing horses, repairs to wagons, repairs to tools and the sharpening of same, etc.)	4,953.15
Miscellaneous repairs to boxes, staking and strapping, etc	439.97
Planting trees on the streets (including lifting trees in the nursery and trimming the same and digging tree holes)	3,632.35
Payments to clerks and laborers for holidays	666.87
Removing wooden boxes from street trees	500.26
Removing iron tree guards from street trees	23.72
Storm damage	413.76
Spraying trees with arsenate of lead for the destruction of leaf-eating insects	1,245.21
Teamster to assistant superintendent	188.50
Tree surgery	1,510.31
Trimming street trees	5,783.08
Removing dead, decayed, and dangerous trees	3,559.97
Trimming hedge	12.93
Miscellaneous work performed by this department, reimbursement being secured by repayments from other appropriations and deposits	1,820.77
Total	35,912.55
Materials, supplies, miscellaneous repairs, etc.:	
Arsenate of lead	4,000.00
Ambulance hired to remove a sick horse, property of the District, from the street to the hospital	6.00
Auto truck purchased	1,500.00
Auto truck accessories, repairs, etc	324.86
Buggy and wagon findings and repairs	45.47
Car tickets	10.00
Cement and cement sacks	177.20
Drugs	8.30
Electric current	78.00
Fertilizer and grass seed	176.45
Forage	4,483.83
Fuel	107.23
Gasoline	497.30
Gas tar	15.00
Harness	140.00
Hose and nozzles	13.00
Iron, steel, horseshoes, and pads	284.80
Jacks, locomotive screw	11.00

Materials, supplies, miscellaneous repairs, etc.—Continued.	
Lime	$8.10
Lime sulphur	20.00
Locks	22.27
Lubricants	35.01
Lumber for boxes (stakes included)	1,207.10
Lumber, miscellaneous	267.07
Paints, oils, and glass	261.45
Plumbing supplies	7.30
Rope, twine, etc	4.10
Repairs to office furniture and supplies	5.85
Sand, building	7.97
Screw hoist and trolley	80.75
Soil purchased	38.70
Spraying machine accessories	57.97
Stable and blacksmith supplies	254.29
Stationery, printing and office supplies	404.16
Seedlings purchased (Norway maple)	40.00
Stoves, stovepipe and elbows	19.26
Stump puller	159.00
Sundries	46.32
Tank and pump for storage of gasoline	331.20
Telephone call	.05
Trees (evergreens and shrubbery purchased)	147.80
Tools and agricultural implements	477.14
Wagons	672.25
Washers, wire, bolts, tin, nails, hinges, screws, etc	325.78
Whale-oil soap	99.48
Woodworking machinery	3,031.50
Total	19,919.31

NOTE.—In a number of cases the estimated cost of the supplies is given because the bills for the same have never been submitted. The cost given on the stump puller includes the estimated cost for freight.

Charges against appropriation for labor and materials furnished in connection with work performed by other departments:	
An overhead charge for inspection and supervision for cost of personal services employed in the municipal garage. (E. D. 143935/3)	50.00
Construction of one case for office stock	213.12
Improvements and repairs to building, plumbing, etc., at the nursery located at Iowa and Georgia Avenues	250.96
Improvements and repairs to stables and shops at the parking commission yard; also alterations to buildings at the E Street nursery (this includes the work of paving the yard and the stable and shops).	3,272.96
Lantern slides	1.25
Paving abandoned tree spaces	766.90
Part payment on Wales Adding Machine	200.00
Proportionate part of the compensation of E. S. Dawson	92.25
Printing terrace forms, letter heads and ruling cards	25.08
Photography	3.76
Repairs to spraying machine	2.76
Repairs to Velie auto truck	141.95
Repairs to White auto truck	332.69
Total	5,353.68
By appropriation, "Streets, District of Columbia, 1918, parking commission"	60,000.00
By repayment to above appropriation	2,746.60
Total	62,746.60
Labor	35,912.55
Materials	19,919.31
Charges against appropriation	5,353.68
To balance of above appropriation, unexpended	1,561.06
Total	62,746.60

Expenditures from miscellaneous appropriations, exclusive of parking commission.

Appropriation.	Through repayment.
Construction of suburban roads and suburban streets, District of Columbia, 1918, Ninth Street NW., U to V Streets, pave	$12.34
District of Columbia Fuel Administration	88.45
Improvements and repairs, District of Columbia, 1917:	
Assessment and permit work	23.34
Southwest schedule	45.45
Sidewalks and curbs	698.71
Twelfth Street NW., E to F Streets, repave	92.61
Improvements and repairs, District of Columbia, 1918:	
Assessment and permit work	557.37
Grading streets, alleys and roads	107.46
Thirteenth Street NW., E to F Streets, repave	136.28
Repairs to streets	327.59
Northwest schedule	2.60
Repairs to suburban roads	31.79
Miscellaneous trust fund deposits	503.96
Miscellaneous trust fund deposits, Chesapeake and Potomac Telephone Co., general deposit	19.94
Maintenance, etc., of playgrounds, District of Columbia, 1918, maintenance, etc	46.32
Maintenance municipal building, District of Columbia, 1918, miscellaneous	5.79
Public schools, District of Columbia, 1918, repairs to buildings	4.71
Streets, District of Columbia, 1918, cleaning, etc	41.89
Total	2,746.60

Sums expended during the year for employment of per diem employees, paid from the appropriation for "Streets, District of Columbia, 1918, parking commission."

1 computer, 276½ days, at $4	$1,106.00
1 computer, 41½ days, at $4	166.00
1 copyist, 44 days, at $3.50	154.00
1 copyist, 104¾ days, at $3.50	366.63
1 copyist, 30 days, at $3	90.00
1 copyist, 54 days, at $3	162.00
Total	2,044.63

Sums expended during the year for the purchase and maintenance of horses and wagons, together with the amounts paid for single and double wagons hired.

[These items included in the material list.]

Horses, forage, wagons and miscellaneous equipment and repairs		$5,394.61
Single wagon hire, 44¼ days at $3 per day	$132.75	
Single wagon hire, 75½ days at $3.20 per day	241.60	
Double wagon hire, 136¾ days at $5 per day	683.75	
Double wagon hire, 373 days at $5.44 per day	2,029.12	
		3,087.22
Total		8,481.83

Very respectfully,

C. LANHAM,
Superintendent of Trees and Parking, District of Columbia.

ASSISTANT TO THE ENGINEER COMMISSIONER, DISTRICT OF COLUMBIA.

REPORT OF THE PERMIT CLERK.

WASHINGTON, D. C., *August 28, 1918.*

SIR: I have the honor to submit the annual report of this office, giving the character and number of permits issued during the fiscal year ended June 30, 1918:

PERMITS FOR WHICH FEES WERE PAID.

Water connections	$624.00
Repairs	1,184.00
Sewer connections	733.00
Repairs	647.00
Gas and electric light connections	1,802.00
Repairs	182.00
Auto tire-inflating and gasoline lines	7.00
Conduits, construct and repair	319.00
Gas mains, construct and repair	114.00
Guard stones, place in alleys	8.00
Manholes, construct, enlarge, also connect with sewers	215.00
Oil pipe lines, repair in roadway	6.00
Parking fences, erect	134.00
Pipes, lay across sidewalk, also alleys	3.00
Poles, telegraph and telephone, erect, replace, and remove	252.00
Wagon tags, 11	5.50
Total	6,241.50

PERMITS ISSUED FOR WHICH NO FEES ARE PAID.

Special, water, sewer, and gas	677
Blasting	13
Bridges across gutters	8
Cables, aerial and overhead connections	179
Driveways, lay and repair	47
Engines and steam shovels, move through streets	145
Parking fences, repair	24
Parking leads, lay and repair	246
Parkings, pave	43
Permits, renew and extend	68
Poles, replace trolley	11
Pumping line, lay oil pipe	1
Roadways and alleys, close temporarily	13
Roadways, grade and repair	37
Sidewalk space, grade	8
Sidewalks, haul across	41
Sidewalks, lay and repair	119
Sidewalk and roadway, occupy temporarily	2
Sidewalks, use for business purposes	15
Shelter houses, erect and place at curb	5
Steam and electric railways	41
Steps in parkings, construct and repair	118
Stopcock boxes, regulate and replace	49
Trees, trim or remove	37
United States Government	29
Walls, build or repair retaining	53
Water tables, lay or repair	22
Wires, string overhead	208
Miscellaneous	38
Total	2,297

One thousand eight hundred and seventy-three communications were referred to this office. Briefs were made of these on cards, permits issued when necessary, reports made, papers indorsed and returned to the respective divisions having supervision over the inspection of the work for which the permits were issued.

Eight thousand two hundred and thirty-eight applications for permits were sorted, arranged according to the location of the work, and filed for ready reference. A written report was made of all permits for excavations in the public space and forwarded to the engineer of highways.

Very respectfully,

H. M. WOODWARD,
Permit Clerk.

INSPECTOR OF BUILDINGS.

REPORT OF THE SUPERINTENDENT OF THE WATER DEPARTMENT.

OCTOBER 5, 1918.

SIR: I submit the annual report of the water department for the fiscal year ended June 30, 1918:

The department has done everything possible during the fiscal year to prevent waste of water but with very poor results. The per capita consumption can not be given owing to lack of information as to the population of the District of Columbia; however, the total mean daily consumption for the year was 59,606,970 gallons, while for the year ended June 30, 1917, it was 51,454,000 gallons. This increase of practically 8,000,000 gallons per day is mainly owing to the increase in population but to some extent to noncompliance with requests from water department officials to officers in charge of Federal and municipal institutions that are using large quantities of water and wasting a great deal more than they should.

In my opinion the only practicable method of preventing this waste is to charge both Governments for water used above a fair percentage on their investment in the aqueduct and filtration plants and a portion of the distributing system of the water department; then when bills are presented to the authorities in charge of these various departments and institutions it will give them an opportunity to investigate and stop the waste in these places. This scheme is a perfectly feasible one and could be put into execution after ascertaining the value, less depreciation, of the sum spent for construction work by the aqueduct office, the District government and the water department. After ascertaining this valuation, which, in my opinion, should be made by parties not connected with any of the above named departments, a fair percentage should be allowed under this valuation and water allowed for this amount. The water used over this amount should be charged for at the same price the citizens of the District have to pay. Necessarily if the above-outlined plan receives the approval of the Commissioners of the District of Columbia it would also have to be authorized by the Congress of the United States before becoming effective.

The further increase in amount of water used during the fiscal year again appeals to me to urge a greater water supply for the District, although I am of the opinion that the supply is ample for 500,000 people if properly conserved and if every householder and citizen will lend aid to prevent the enormous waste now going on.

In connection with the mean daily consumption of water it is pertinent to bring to your attention the large increase in amount of water pumped by the various services. On our first high or direct service the increase is approximately 27 per cent; on our second high, 11 per cent; third high, 23 per cent; and on the fourth high, or Reno tower feed, 40 per cent. The increased pumpage for the three high services supplied from our Bryant Street pumping station averages approximately 20 per cent for the year, and the increase in coal used for this purpose is about 15 per cent. On the two pumping services south of the Anacostia River, there is a decrease in pumpage of 378,158 gallons.

For several years I have asked for an appropriation to cover one basin of Brightwood Reservoir. This year I did not ask for an appropriation for this purpose owing to the fact that the cost would probably be twice what it was when I last requested this appropriation, and for the further reason, that it is doubtful if the United States Government would allow a contract to be entered into for this work owing to conditions now existing. The need for this cover on Brightwood Reservoir is still very apparent to me, as the water in that reservoir is liable at any time to be contaminated by germs brought by wind and rain, moreover, if covered, the waste of large quantities of water when the necessity of cleaning the reservoir arises would be prevented.

During the fiscal year only 966 meters have been installed. This brings the percentage of services metered to approximately 86. It was impossible to place many meters this year owing to serious labor shortage. The department has a large number of meters in stock which it was unable to install, still these meters were secured at a much lower figure than now prevails, and the department will install them when times are more settled.

The territory bounded by B Street north, Pennsylvania Avenue, Seventeenth and Twenty-first Streets west, inclusive, has been greatly improved by the installation of large trunk mains for which appropriations were made by Congress. This work is practically completed and a territory that lacked woefully in its supply of water for domestic purposes and fire protection is now amply supplied.

The total length of mains laid during the fiscal year was 27,735 feet, or 5.2 miles.

The reports in detail of the several divisions of the department are submitted herewith.

I wish to record my appreciation of the employees of the department, who have worked faithfully and efficiently during the year.

J. S. GARLAND,
Superintendent, Water Department.

ASSISTANT TO THE ENGINEER COMMISSIONER.

Engineering and Construction.

Sir: I respectfully submit the following report of work done by Division D, engineering, construction, plans, estimates, tests, and records, for the fiscal year ended June 30, 1918:

For the extension of the second high service to the vicinity of Conduit Road from Forty-seventh Street to the District line a 16-inch trunk water main was completed in New Cut Road from Thirty-seventh Street to existing 16-inch water main in New Cut Road, about 300 feet east of Conduit Road. An increased pressure of approximately 30 pounds per square inch was obtained by this extension.

Work was begun on the extension of a 24-inch trunk water main in Twenty-first Street NW., southward from L Street to territory west of Seventeenth and north of B Streets NW., in which numerous frame office buildings for United States Government purposes have been erected. This water main is necessary to improve the water service for fire and domestic purposes in the area affected.

Incidental to the erection of office buildings referred to in preceding paragraph the Capital Traction Co. extended their tracks to this section, necessitating considerable work of laying new water mains to replace those that were situated within the track space, these old mains being either removed or abandoned.

Total number of water mains laid, ranging in size from ¾ to 36 inches	48
Old water mains lowered	8
Valves installed, 3 to 20 inches in size	294
Valves removed and abandoned	68
Air valves installed	17
New valves installed in place of old	3
Valve casings installed	358
Buffalo boxes installed	13
Valve casings removed	59
Buffalo boxes removed	21
Valve casings installed in place of old	26
Valve casings installed in place of old Buffalo boxes	10
Valve casings adjusted to grade	25
New fire hydrants erected in place of old	109
New fire hydrants erected in new locations	31
Fire hydrants removed and abandoned	59
Fire hydrants adjusted to grade	25
Fire hydrants paved around	60
Fire hydrants sodded around	1
Street hydrants paved around	17
Horse fountains paved around	4
Cuts paved on account of leaks	28
Sodded cuts on account of leaks	44
Paved cuts over new mains	3
Sodded cuts over new mains	2
Paved cuts around meter-box covers	5
Paved cuts around curb cock boxes	2
Paved cuts over service pipes	2
Installed connections to public and private premises	54
Miscellaneous jobs completed	25
Number of valves operated	9,273
Number of valves packed	187
Number of valves fitted with new key nut	10
Number of valves examined	147
Number of valves repaired	42
Number of valves fitted with new stems	21
Number of valves fitted with inner frames and gates	2
Number of valve casings cleaned	40
Number of valve casings uncovered	261
Number of valves marked for number plates	174
Number of valve number plates installed	143
Number of valve casings inspected for number plates	2,417
Number of valve casings examined for grade	1,840
Number of valve casings examined for conditions	3
Number of valve casings examined for new covers	2
Number of valve casings installed in place of old	3
New valve casings covered in place of old	2
Air valves repaired	3

Air valves examined	6
Blow-offs flushed	2,461
Indicator posts cleaned	12
Indicator posts reerected	1
Indicator posts removed and abandoned	3
Indicator posts cleared of weeds	15
Intersections located	100
Alley squares located	2
Fire hydrants examined	26,001
Fire hydrants repaired	751
Fire hydrants flushed	353
Fire hydrants painted	5
Fire hydrants lubricated	1,708
Fire hydrants thawed out	14
Fire hydrants reerected	3
Fire hydrants reversed	11
Fire hydrant air valves placed	66
Weeds cleared from around fire hydrants	71
Fire hydrant pressures taken	438
Public hydrants erected	7
Public hydrants erected in place of old	13
Public hydrants examined	4,419
Public hydrants repaired	309
Public hydrants abandoned	6
Public hydrants removed	4
Public hydrants reerected	3
Public hydrants thawed out	220
Public hydrants adjusted to grade	3
Public hydrants temporarily erected	1
Public hydrant curb boxes adjusted to grade	1
Horse fountains erected	3
Horse fountains erected in place of old	3
Horse fountains repaired	34
Horse fountains cleaned	5,844
Horse fountains examined	20
Horse fountains thawed out	168
Horse fountains float valves placed	3
Horse fountain float valves adjusted	8
Pumps examined	1,542
Pumps erected in place of old	2
Pumps repaired	27
Pumps thawed out	10
Sanitary drinking fountains repaired	38
Sanitary drinking fountains cleaned	260
Sanitary drinking fountains removed	1
Sanitary drinking fountains reerected	4
Sanitary drinking fountains cups adjusted	2
Sanitary drinking fountain improved jets installed	14
Traps cleaned	2,254
Traps repaired	1
Standpipe removed from blow-offs	3
Springs cleaned	4
Drain pipes cleaned	20
Drain pipes thawed out	2
Water mains flushed	11
Mains cut off and recharged for construction work	75
Meters installed	4
Meters abandoned	1
Bleeders installed on dead end of mains	3
Bleeders repaired	2
Fire alarms answered	2
Wells cleaned	4
Smith cuts made	18
Broken mains repaired	46
Joints repaired	303
Service pipes closed for repairs	1,402
Service pipes found closed	457
Valves reported leaking	44

Meters reported leaking	170
False reports of leaks answered	146
Service pipes frozen	41
Surveys made for new mains	99
Levels run for new mains	65
Resurveys for water mains	7
Preliminary surveys	11
Staked for new fire hydrants	84
Staked for new public hydrants	7
Staked for new valves	8
Staked for private connections	51
Staked for new meters	3
Staked for meter vaults	3
Surveys for rearrangement of mains	6
Preliminary levels run	39
Restaked for new fire hydrants	3
Investigation of low water pressures	21
Recording pressure gauge charts collected	112
Visits to work in progress	894
Completed notes turned in	255
Fire hydrant elevations established	125
Fire hydrant cards made	183
Levels run to check bench marks	5
Tests of private and municipal water meters, excluding meters on endurance tests	10,124
Drawings and tracings made	63
Projects made	60
Files forwarded to assessor	52
Cards forwarded to assessor	71
Posting of maps and tracings	798
Valve notes posted	510
Communications, reports, etc., written	1,558
Permits passed	312
Intersection cards made	29

The cost of operating pumping engines at the District pumping station during the year ended June 30, 1918, was $74,172.88.

Total pumpage for the year, without allowance for slip, was..gallons..	10,648,160,000
Greatest amount pumped in one day, June 6.....do....	38,695,400
Least amount pumped in one day, July 8.....do....	23,043,300
Average amount pumped in one day.....do....	29,173,041
Average dynamic head against pumps, in feet	100.698
Cost of fuel, pumping 1,000,000 gallons 1 foot high.....cents..	4.19
Total operative cost of pumping 1,000,000 gallons 1 foot high..do....	6.92
Total operative cost per 1,000 gallons pumped.....do....	.697

The pumpage is figured from plunger displacement, without allowance for slip.

The aggregate slip of all reciprocating pumps during the year, based on pitometer determinations, was 4.83 per cent. Venturi meter measurement was made of pumpage by the centrifugal pumping unit. The average dynamic head is figured from the total work done by pumping engines and generators. The fuel consumed is the total coal burned, excluding the heating system. The cost of heating (421,880 pounds of coal) was $1,300.81.

Operating expenses:	
Salaries—1 chief steam engineer, at $1,750 per annum; 2 steam engineers, at $1,100; 3 assistant steam engineers, at $1,000; 3 firemen, at $875; and 4 oilers, at $610 (less deductions on account of leave)....	$9,220.05
Miscellaneous per diem labor—substitute engineers, substitute firemen, boiler cleaners, steam fitters, electrician, helpers and laborers..	9,756.46
Coal—14,566,515 pounds of bituminous coal, at an average cost of $6.91 per ton	44,913.09
Oils, greases, etc	1,577.15
Repairs to pumps, engines, boilers, and electric generators—	
Per diem labor	5,654.92
Material expended	3,051.21
Total cost of operation	74,172.88

Samples of water were collected once each week from Brightwood and Reno Reservoirs and delivered to the chemist at the filtration plant. The collection of these samples was discontinued after July 20, 1917.

The meter on end of 20-inch blow-off main in Rock Creek back of Brightwood Reservoir was removed and replaced whenever necessary to test same or to drain the reservoir. An examination of Brightwood and Reno Reservoirs were made once each week. Readings were taken weekly on meter at end of 20-inch blow-off main in Rock Creek back of Brightwood Reservoir. All valves controlling Reno Reservoir were operated once each month to keep same in good working order. Removed all angle valves from standpipes, drained and capped same for winter months, and replaced and turned on water for summer months at the Bryant Street pumping station, Anacostia pumping station, Brightwood and Reno Reservoirs. The field wagon gauges were tested once each month during the year. All plumbing was kept in repair in water department buildings, including Camp Pleasant and Camp Good Will.

The towers supplying water to Good Hope, Randle Highlands, and Congress Heights were inspected once each month. Examined fire hydrants and large tanks supplying grounds at Blue Plains, D. C. Extended the second high service in Reservoir Street NW., from Thirty-seventh Street to Conduit Road, and in Conduit Road from Forty-seventh Place to District line, thus supplying the territory in Conduit Road which has previously been supplied by first high service.

Flushed objectional foreign matter from gates of closed valves on dividing lines between services.

All valves equipped with valve operating machines were operated once each month to keep same in good working order. Monthly examinations were made of valves controlling services to the Columbia Hospital and the Willard Hotel.

The elevation of water in both basins, also in 24-inch standpipe, was taken at 1 p. m. weekly at Brightwood Reservoir for computations in conjunction with the meter readings.

Bimonthly pressures were taken on 45 fire hydrants in the city and county during the year.

Weekly recording pressure charts were collected during the summer months.

D. W. HOLTON,
Engineer.

The SUPERINTENDENT OF THE WATER DEPARTMENT.

STEAM ENGINEERING AND SHOPS.

SIR: The following is a summary of work done at the District pumping station during the fiscal year beginning July 1, 1917, and ended June 30, 1918.

Water pumped, figured from plunger displacement:		
First high service	gallons	7,003,710,690
Second high service	do	2,836,902,870
Third high service	do	804,444,200
Total		10,645,057,760
Fourth high service	gallons	108,272,624
Coal burned	tons	6,682.65
Cylinder oil used	gallons	748.71
Engine oil used	do	1,088.5
Filtered oil used	do	1,002.5
Grease used	pounds	425.0
Waste used	do	847.5

The regular force employed for the operation of the pumping engines, boilers, and auxiliaries, cleaning of machinery, etc., is as follows:

	Steam engineers.	Assistant steam engineers.	Firemen.	Oilers.	Cleaners.	Laborers.
Sunday	4	3	3	4	4	.....
Week days	4	3	3	4	4	4

For the fourth high service the water is pumped from the Reno Reservoir (which is supplied by the third high service pumps) to an elevated tank, by gasoline engines and triplex pumps. This machinery is operated daily by the watchman in charge of the reservoir, and two assistants on night duty. The water pumped for this service during the year was 108,272,624 gallons, or a mean of 296,637.3 gallons daily.

The Anacostia pumping station has been operated without interruption during the year, pumping to the three towers supplying the area east of the Anacostia River. This station is taken care of by four men.

The water pumped during the year, figured from plunger displacement, follows:

	Gallons.
First high service	126,615,300
Second high service	10,949,886
Total	137,565,186

Or a mean of 376,890.9 gallons daily.

REPAIR SHOPS.

The work accomplished during the year follows: All necessary repairs for machinery at the District pumping station, fourth high service and Anacostia stations; repairs to automobile trucks, both for this department and the several departments of the District of Columbia; made practically all repair parts for fire plugs, valves, street hydrants, etc., including all tools used on the work of laying water mains, etc., such as picks, chisels, breakers, calking tools, yarning irons, valve keys, pipe bands, eye-bolts, arch irons and miscellaneous tools and appliances as required for the various work.

The detail of the work follows in part: Repaired gear in lathe; recut threads on 150 bolts for stock; made new screw for valve on economizer; repaired transit; tested 4 boilers; machined parts for auto valve operator; pumped tank cars of fuel oil to Anacostia station; reversed bells on fire plugs; moved and connected gasoline tank at Reno Reservoir; repaired ejector on water softener; machined 4 bearing boxes for crane at wharf; cleaned out burner on gas heater in repair shop; bored and threaded 20 pipe caps; repaired gear wheel for conveyor driver; repaired brass rail around engine room; faced boiler tube caps; repaired set for storekeeper; repaired bearing on waste cleaning machine; made six 2½-inch hose spuds; ran water pipe line from vault for Water Survey Division; retapped and made set screw for drill press in blacksmith shop; put new jaw in pattern makers vise; recut steel die for storekeeper; repaired screw in pipe-cutting machine; made repairs to lathe; made repairs to ratchet for 12-inch pipe-cutting machine; tested and cleaned gauges; machined lathe chuck jaws and jigs; ground latch plates on No. 4 engine; made nipple turning gauge; made repairs to lime tank syphon; tightened wrist pin and glands on No. 6 engine; machined auto wheel; repaired economizer east side scraper line; made brass casting for male thimbles and for McKinley High School; made repairs on lathe shifter; tapped pipe for thermometer well on economizer; repaired motor starting crank; bored 15 wheels for coal conveyor; put curved section track under driver; put new joint in steam chest on shop engine; connected manograph for Pitometer Division; repaired tool holder for lathe; soldered oil cans; drilled horse fountains; cut nipples for centrifugal pump; bored and threaded pipe plugs for blow-off connections; cast bronze statues for Mr. Connor; drilled irons and made bolts for tripod derrick; made repairs to lathe carriage; repaired 12-inch hack-saw frame; turned commutator on armature for coal conveyor; repaired shop engine; bushed valve wheel for boiler room; machined match plate pattern and core box; repaired radiators on east end of building; repaired leaks in greenhouse; made repairs to engine room balcony; drilled clamps; made castings for Sewer Department; repaired rheostat on 62-inch boring mill; repaired Hauck oil burners; made repairs to West economizer; made tools for 62-inch boring mill; made nickel-iron castings for Coast and Geodetic Survey; repaired kerosene pump; put new bibb cocks in toilets; machined furnace castings; packed 125-kilowatt turbine generator; repaired oil pump on bolt cutter; packed valves in boiler room; repaired triplex pump; repaired tail trap on No. 5 engine; machined lock nuts for water column No. 7 and No. 8 boilers; installed 6-inch pipe line for testing 6-inch meters; packed plungers on No. 3 pump; made 100 brass valve springs for pumps; repaired arm for low-pressure valve motion on No. 4 engine; put new disks in clutches and cleaned mufflers at Anacostia station; machined hose coupling for tube-blowing hose; made bushings for motor on grinder in blacksmith shop; machined 6 drain bowls for

health department; repaired foot vavle for pump; packed turbine stuffing box; put in offset links in chains at Anacostia station; made repairs to vacuum pump; packed valves on steam main in auxiliary space; made new set of dies for bolt cutter; repaired valve stems and igniter for engines at Reno reservoir; repaired office chairs; made handles for tools; repaired igniter for No. 3 engine; made two extra-heavy caps for receiving chamber on Holly return system; machined new clutch for economizer scraper drive; repaired gauge for No. 5 engine; repaired oil cans for engine room; repaired valve on oil filter; tightened joint on first receiver No. 4 engine; repaired pet cocks in engine room; made expander for condenser tubes; made 2 keys for door in station for storekeeper; repaired handle on coal chute in boiler room; repaired grate for heating boiler in garage; made new stem for 6-inch valve to sluice box; repaired oil furnace; repaired air compressor on No. 5 engine; made gas connections for soda kettle in repair shop; cut off 4 pieces 5-inch beam for meter vault; fitted up 5 sets of hangers and 5 aluminum signs for the electrical department; put new joint in air compressor; repaired oil pipes on No. 6 engine; made repairs to ditch rammer; repaired curb cocks; refitted key on lay shaft on No. 4 engine; repaired check on No. 5 feed pump; repaired trap at 150 kilowatt machine; made 2 bearings for stoker motor; repaired ice crusher; fitted up brackets for coal conveyor; made and set iron ladder in boiler room; made parts for rod meters; made repairs to No. 6 boiler stoker; packed valves on heating system; put Kerr turbine on bed plate; turned off 1 lamp-post shaft for the electrical department; repaired throttle valve for turbine; made radiator caps; repaired stop valve over No. 4 pump; cleaned out blow-off tank in basement; changed try cocks on No. 7 and No. 8 boilers; changed gauge cocks on No. 8 boiler; repaired levers on coal chute; machined 2 operating screws for 12-inch yoke stops; machined 6 screws for Viney and Baker valves; made leather foot valve for water tank Lea recorder; put new gears on friction drive on Kendley lathe; repaired grate in foundry; repaired 1 washer cutter; made new well for recording thermometer; repaired oil cap on No. 2 engine; fitted up street hydrants; made repairs to small pipe-cutting machine; repaired radiator for watch house; repaired buckeye furnace for melting lead; sharpened 2 8-inch Smith pipe cutters; put new gear on motor shaft for triplex pump; repaired loading chute under coal crusher; made repairs to pump on spraying machine; cut off pipe for use as ditch braces and drilled same; repaired tool rest on pipe-cutting machine; turned up pin for drag link on No. 4 engine; repaired 1 pressure regulator; machined new wedge for crosshead on No. 4 engine; cut off brass collars for 8-inch valves; milled ends for 12 calking sets to fit pneumatic hammers; made castings for Signal Corps; made castings for Research Council; repaired 1,506 water meters; repaired two-way valves as follows: Two 3-inch, seventeen 4-inch, twenty-one 6-inch, fifteen 8-inch, one 10-inch, six 12-inch, three 4-way, two 3-way; built two-way valves as follows: Fifty 8-inch, five 12-inch, three 3-way, six 4-way; total valves 135, and completed numerous other jobs for the department's upkeep.

BRASS FOUNDRY.

During the year all composition metal castings for valve work, repair parts, etc., have been made in our foundry, which has been operated without interruption. There were made in the foundry 10,412 pounds of brass castings, small and medium size, such as would be made in a general jobbing shop, also aluminum signs for the electrical department. The showing of the foundry for the year is very satisfactory, and the repair work at this station has been much expedited by the casting of repair parts when needed for emergency.

BLACKSMITHING.

The blacksmiths have sharpened 76 drills; made 1 curb and extension key, 1 casing hook, 22 stakes, etc., repaired 237 stakes; sharpened 4,511 chisels and 6,359 picks; welded new ends on picks; repaired 149 curb and extension keys, 53 casing hooks, 175 steel bars, 57 frost pins, made 1 tunneling bar and repaired 18 tunneling bars; made irons for concrete forms, 33 five-sided keys, damper levers for boilers, S wrenches, hook bolts, chisels, pipe bands, stone drills, and many necessary repairs to wagons and auto trucks.

CARPENTRY.

The carpenters have repaired 3 spirit levels; made door for Reno Lodge; made repairs to autos; repaired bench in electrician's shop; repaired cover on pit at Reno Station; repaired 15-ton platform scales; filled up casting to be used as pattern for castings for health department; made forms for cement rings; repaired weir; inspected

buildings of the department; filed saws; repaired hooks in stable; built cabinet for water survey division; repaired field boxes; repaired leaks at Fiftieth and Deanwood Streets; repaired steps in auto repair shop; made case for office; repaired doors of iron house; made gauge board for boiler room; made 3 boxes for storing record cards; reset weather strip in room 40; repaired hangers on doors at repair shop; built derrick for ditch work; built 2 desk cases; made patterns; repaired platform around conveyor over boiler room; made 2 card cases for office; made 2 waste boxes for engine room; repaired blinds at Anacostia Station; made handles for wheelbarrow; repaired bodies on wagons; repaired sash in engine room; built meter vault at Thirty-fifth and Q Streets NW.; made repairs to patterns; boxed parts for shipment; made jacks for leak truck; sharpened saws for storekeeper; repaired sign patterns for the electrical department; repaired gauge boxes; repaired roof on garage; built meter vault at Sewerage Pumping Station; repaired roof on blacksmith shop; made cover for soda kettle; made blocks for trolley support on crane; made tank for pitometer division; repaired watch boxes; boxed impeller for De Laval Co.; made handles for tools; built concrete meter vaults on Nebraska Avenue; repaired wheel on 5-ton truck; made lattice floor and benches for Lea recorders; built meter vault at Fourth and Channing Streets; repaired platform on yard crane; repaired doors in boiler room; made 5 lamp boxes for wagons; built trestle for harness room; built shelves for auto repair shop; made cradle for gasoline tanks and repaired covers over gasoline tanks at Reno Reservoir; repaired screens for stable; made slate floor for Engine No. 1, repaired platform in repair shop; cut and fit braces for No. 4 pump; repaired bridge rail at Woodridge; built areaway at Reno Lodge; made eight hundred and seventy-six 8-inch concrete rings, three hundred and sixteen 8-inch sectional rings, two hundred and eight 8-inch, one hundred and fifty 4-inch, twenty-five 36-inch cylinder rings and 15 reducing rings; filled 246 casing covers; made twenty-five 24-inch and thirty-seven 4-inch covers and roughed 234 covers.

PAINTING.

The painters have painted wagons and automobiles; repaired auto cushions; painted and glazed doors at garage; painted pipe at Anacostia Station; whitened walls in entrance to vault at Fourth and College Streets; painted skylight over paint shop; cleaned and painted pipes and girders at M Street Bridge; repaired asbestos covering on boiler drum heads; have covered and painted piping and drains in front of boilers; painted woodwork on bridge at Langdon; painted gutters and leakmen's shelter; painted steel platform and operator at Fourth and College Streets; painted electric globes; finished oak cases for water registrar's office; painted walls of pump house at Anacostia Station; repaired cots for leakmen; painted pipe and footwalk under Sixteenth Street Bridge at Piney Branch; painted 20 red lantern globes; painted door in vault at Fourth and Bryant Streets; painted 24 street hydrants; painted steel beams on 15-ton scale; cleaned and painted boats at Brightwood Reservoir; painted electric conduit in basement; covered pipes and painted generator No. 1.

ELECTRICAL WORK.

The electrician and helpers have taken care of generators, switchboards, motors, lights, etc.; operated conveyor, economizer, and crane; tested and recharged storage batteries; repaired electric fans and lighting systems on various automobiles; cleaned ejector in coal crusher; put new trolley supports on crane in yard; repaired telephone cable at Reno Reservoir; set Kerr turbine engine on bedplates and connected same; repaired cable on No. 6 pump; made repairs to sheave beam on yard crane; put 3 wheels and 1 new axle on conveyor; repaired centrifugal pump; repaired fuses; repaired motor drill; made set of spark wires; repaired fixtures; repaired blow torch for foundry; made adjustments to motor at Girls' Reform School.

CARE OF STATION.

The janitor and his force have taken care of all cleaning throughout the building; removing shavings from the wood-working shop; attended to window cleaning; removing turnings, scrap, and other material from machine shop; furnished messenger service to the office, etc.

JAS. T. FINK,
Superintendent of Machinery.

The SUPERINTENDENT WATER DEPARTMENT.

Water Surveys.

Sir: The waste-prevention surveys were made during the year in four of the permanent survey districts, embracing the majority of the gravity and a substantial portion of the first high territories. The underground leakage detected and prevented was at the rate of 834,640 gallons per day with an average waste per leak of 5,717 gallons per day. This latter figure is relatively small as compared to previous figures and supports our statement that the routine surveys prevent much loss of water by the early stoppage of small leaks, which if neglected would grow to substantial size. Study of statement No. 1 in the supplements of this report gives interesting information on this matter. The complete results of the year's work are shown on statement No. 2 and an analysis of the sources and comparative quantities of leakage for a number of years is shown on statement No. 3. Statement No. 4 gives the comparative yearly results of the house-fixture inspection. The points worthy of special note in these statements follow with brief comment.

As in past years corroded iron services were found to be heavy offenders in the matter of water waste and records on file indicate that trouble is to be expected from this source for some time to come. The large number of calked joints found defective indicates that severe leakage from this source may also be found at practically all times. Most of the joint leaks were found on the old 6-inch mains, where workmanship was of a class not measuring up to the standard now maintained. A surprisingly few leaking joints have been found on recently installed mains where it is known that sufficient calking lead was used. In the house-fixture inspection heavier percentage of fixtures were found leaking this year than during any previous year since 1913. This is probably due to the increased use of the fixtures by the extra population or to the infrequent inspection caused by shortage of employees.

A number of special investigations, estimates, measurements, etc., were made during the year. Some of these brought out waste of water and resulted in its stoppage. In this connection may be mentioned a night inspection of all school buildings, and measurement and tests at the Bureau of Standards. Special tests were also made at the Ford Building and at Fort Myer to secure information to be utilized in official communications relative to excessive water usage in these institutions. Statements were prepared showing use of water by all Federal fountains, Federal and municipal buildings, and sewer department flush basins. Important work was also done in the stoppage of underground leakage which was flooding the Federal heating and lighting tunnels in D Street between Twelfth and Fifteenth Streets NW.

Unusual conditions as regards the water supply existed during the year and the work of this division was hampered to a considerable extent, not only by the loss of several of the most valuable employees but also by the changed conditions in the rates of flow which interfered with the tests and by the inability to prosecute any work in the Federal buildings, where substantial results have been accomplished in past years.

In recording my appreciation of the work of the employees of this division I wish to call attention to the fact that the saving of 834,600 gallons of water per day at a total expenditure of $19,345.81 represents an annual return of over 80 per cent upon the investment. This percentage is based upon the sale price of water at 4 cents per 100 cubic feet, which is the proper figure to use under the present conditions, where the department has been forced to request a reduction in water consumption to avoid a shortage.

Paul Lanham,
In charge Water Survey.

The Superintendent Water Department.

Supplements.

Statement No. 1, underground leaks, 1907–1918.
Statement No. 2, year's results, 1917–18.
Statement No. 3, sources and quantities of underground leakage, 1907–1918.
Statement No. 4, results, house inspection, unmetered, 1907–1918.
Statement No. 5, surveys of permanent districts.
A. District A, gravity (miscellaneous).
B. District B, gravity.
C. District E, gravity.
D. District I, gravity.

STATEMENT 1.—*Underground leaks, 1907–1918.*

Year.	Number.	Quantity per day.	Average per day.
		Gallons.	*Gallons.*
1907–08	271	5,604,400	20,700
1908–09	832	9,560,600	11,500
1909–10	532	6,364,200	12,000
1910–11	624	6,921,900	11,100
1911–12	813	5,115,300	6,300
1912–13	651	4,195,100	5,400
1913–14	452	2,552,800	5,600
1914–15	385	1,828,820	4,800
1915–16	420	1,981,600	4,700
1916–17	340	1,752,750	5,155
1917–18	146	834,640	5,717
Total (11 years)	5,466	46,712,110	8,546

STATEMENT 2.— *Year's results, 1917–18.*

Service pipes inspected:	
Metered	18,917
Unmetered	13,965
Houses inspected, unmetered	3,897
Houses with defective fixtures	447
Number of notices served	87
Number of services cut off	31

Underground leakage.

Class.	Number.	Gallons per day.
Abandoned services, taps, etc	4	64,540
Iron services	47	269,700
Lead services	10	58,000
Wiped joints	22	96,300
Services, metered	24	9,500
Couplings	16	38,400
Stopcocks	4	2,600
Joints on mains	49	277,300
Broken mains	1	18,000
Valves	1	300
Total	178	834,640

BLUE PRINTS.

Blue prints made for Division E	608
Blue prints made for Division B	107

EXPENSES.

Operating, per diem labor and material	$19,345.81
New work, per diem labor and material	923.15

STATEMENT 3.—*Sources and quantities of underground leakage, 1907–1918.*

Class.	1907–8	1908–9	1909–10	1910–11	1911–12	1912–13	1913–14
SERVICES.	*Gallons daily.*	*Gallons daily.*	*Gallons daily.*	*Gallons daily.*	*Gallons daily.*	*Gallons daily.*	*Gallons daily.*
Abandoned taps and services	.....	.....	355,300	173,600	174,200	180,900	101,700
Iron services	2,729,000	5,214,000	2,438,000	1,508,900	2,329,800	1,988,800	924,000
Lead services			1,201,900	1,237,600	976,700	394,000	471,000
Wiped joints	327,000		710,100	666,700	438,100	282,300	237,000
Couplings	.....		118,700	182,900	123,700	75,600	66,900
Stopcocks	.....		84,800	43,300	53,500	32,900	16,900
Street washers	.....		.....	42,000	10,400	5,700	500
Public hydrants	.....	.....	.....	84,200	50,200	21,000	12,000
Unclassified	111,000	2,039,500	.....	97,600	103,800	15,000	56,500
Total	3,167,000	7,253,500	4,908,800	4,036,800	4,260,400	2,996,200	1,886,500
MAINS.							
Joints on mains	1,039,900	1,345,600	1,034,200	2,562,500	746,300	962,300	596,800
Broken mains	1,200,000	117,000	332,000	15,900	7,000	103,300	62,200
Valves	23,500	62,000	89,100	110,900	27,100	13,200	6,800
Blow-offs	.....	737,000	.....	176,600	71,300	6,000	.....
Fire hydrants	174,000	45,500	.....	19,200	3,500	115,000	500
Total	2,437,400	2,307,100	1,455,300	2,885,100	855,200	1,199,800	666,300
Grand total	5,604,400	9,560,600	6,364,100	6,921,900	5,115,600	4,196,000	2,552,800

Class.	1914–15.	1915–16	1916–17	1917–18
SERVICES.	*Galls. daily.*	*Galls. daily.*	*Galls. daily.*	*Galls. daily.*
Abandoned taps and services	54,700	68,700	124,400	64,540
Iron services	861,950	449,440	759,600	298,700
Lead services	254,100	201,380	143,900	44,000
Wiped joints	213,500	342.480	128,890	96,300
Couplings	20,500	115,450	126,880	35,700
Stopcocks	17,150	28,700	26,800	4,600
Public hydrants	500	.....	.....	.....
Unclassified	32,200	.....	168,780	.....
Total	1,454,600	1,206,150	1,479,250	543,840
MAINS.				
Joints on mains	368,800	607,350	130,500	267,300
Broken mains	.....	142,800	115,000	18,000
Valves	300	3,300	13,000	5,500
Total gallons	374,220	775,450	273,500	290,800
Total miles	.....	.....	151.5	75.7
Average per mile.....gallons..	.....	.....	1,800	1,106
Grand total	1,828,820	1,981,600	1,752,750	834,640

STATEMENT 4.—*Results, house inspection, 1907–1918, unmetered.*

Year.	Houses inspected.	Houses with defective fixtures.	Percentage.	Year.	Houses inspected.	Houses with defective fixtures.	Percentage.
1907–8 [1]	.....	.....	.....	1913–14	17,039	1,603	9.4
1908–9	27,758	4,621	16.6	1914–15	17,563	1,691	9.6
1909–10	21,642	3,305	15.2	1915–16	6,191	480	7.8
1910–11	21,547	3,262	15.1	1916–17	9,977	904	9.0
1911–12	31,289	4,943	15.7	1917–18	3,897	447	11.2
1912–13	26,397	3,725	14.1				

[1] No record.

STATEMENT 5A.—*Pitometer district A, miscellaneous.*

Subdivision survey:		
Started, Nov. 7, 1917.		
Finished, Mar. 7, 1918.		
Cost		$533.15
Population:		
Resident—		
Metered		978
Unmetered		1,623
Total		2,601
Floating—		
Metered		3,015
Unmetered		401
Total		3,416
Buildings:		
Dwellings—		
Metered		36
Unmetered		217
Hotels and apartments—		
Metered		11
Unmetered		1
Municipal buildings—		
Metered		4
Unmetered		1
Federal buildings—		
Metered		1
Unmetered		0
Factories—		
Metered		0
Unmetered		3
Restaurants—		
Metered		5
Unmetered		0
Miscellaneous—		
Metered		110
Unmetered		147
Total—		
Metered		167
Unmetered		369
Night flow detected by subdivision, per day	gallons	221,800
Due to inside flow—		
Metered	do	62,900
Unmetered	do	78,800
Due to underground leakage—		
Service pipes	do	40,600
Joints on mains	do	10,000
Valves	do	2,900
Total		53,500
Due to Federal buildings and fountains		24,400
Total flow accounted for		219,600
Total flow unaccounted for		2,200
Miles of mains tested		3.5
Cost per mile		$152.33

STATEMENT 5B.—*Pitometer district B, survey No. 5.*

Date of measurement, Mar. 21–30, 1918.

Mean daily supply	gallons	3,578,400
Minimum night rate	do	2,460,100
Ratio of minimum night rate to mean daily supply	per cent	69
Subdivision survey:		
Started, Feb. 8, 1917.		
Finished, Sept. 13, 1917.		
Cost		$1,702.69
Population:		
Resident—		
Metered		12,215
Unmetered		58
Total		12,273
Floating—		
Metered		1,733
Unmetered		1,427
Total		3,160
Per capita consumption, computed from resident population		292
Buildings:		
Dwellings—		
Metered		2,518
Unmetered		19
Hotels and apartments—		
Metered		12
Unmetered		0
Municipal buildings—		
Metered		15
Unmetered		0
Federal buildings—		
Metered		5
Unmetered		12
Factories—		
Metered		8
Unmetered		1
Restaurants—		
Metered		10
Unmetered		0
Miscellaneous—		
Metered		320
Unmetered		7
Night flow detected by subdivision, per day	gallons	519,800
Due to inside flow—		
Metered	do	291,900
Unmetered	do	59,300
Due to underground leakage, service pipes	do	14,900
Due to Federal buildings and fountains	do	102,500
Due to municipal buildings, flush basins, horse fountains	do	37,000
Total flow accounted for	do	505,600
Total flow unaccounted for	do	14,300
Miles of mains tested		16
Cost per mile		$106.39

STATEMENT 5C.—*Pitometer district E, survey No. 5.*

Subdivision survey:		
Started, Aug. 29, 1917.		
Finished, May 12, 1918.		
Cost		$5,721.86

Population:	
Resident—	
Metered	11,463
Unmetered	9,844
Total	21,307
Floating—	
Metered	10,919
Unmetered	2,071
Total	12,990
Buildings:	
Dwellings—	
Metered	1,530
Unmetered	2,096
Hotels and apartments—	
Metered	58
Unmetered	2
Municipal buildings—	
Metered	11
Unmetered	0
Federal buildings—	
Metered	9
Unmetered	25
Factories—	
Metered	17
Unmetered	2
Restaurants—	
Metered	20
Unmetered	0
Miscellaneous—	
Metered	551
Unmetered	173
Total—	
Metered	2,196
Unmetered	2,298
Night flow detected by subdivision, per day ..... gallons	3,718,000
Due to inside flow—	
Metered ..... do	684,400
Unmetered ..... do	1,029,600
Due to underground leakage—	
Service pipes ..... do	276,100
Joints on mains ..... do	32,000
Due to Federal buildings and fountains ..... do	1,547,600
Due to municipal buildings, flush basins, horse fountains ..... do	62,700
Total flow accounted for ..... do	3,632,400
Total flow unaccounted for ..... do	85,600
Miles of mains tested	28
Cost per mile	$204.38

STATEMENT 5D.—*Pitometer district I.*

Subdivision survey:	
Started, Nov. 23, 1917.	
Finished, June 18, 1918.	
Cost	$4,571.18
Population:	
Resident—	
Metered	30,655
Unmetered	599
Total	31,254
Floating—	
Metered	6,822
Unmetered	455
Total	7,277

Buildings:	
Dwellings—	
Metered	3,724
Unmetered	104
Hotels and apartments—	
Metered	139
Unmetered	5
Municipal buildings—	
Metered	16
Unmetered	0
Federal buildings—	
Metered	8
Unmetered	0
Factories—	
Metered	0
Unmetered	0
Restaurants—	
Metered	0
Unmetered	0
Miscellaneous	
Metered	495
Unmetered	16
Total—	
Metered	4,382
Unmetered	125
Night flow detected by subdivision, per day.....gallons..	950,200
Due to inside flow—	
Metered	730,400
Unmetered	43,600
Due to underground leaks—	
Service pipes	50,010
Joints on mains	85,900
Valves	2,300
Due to municipal buildings, flush basins, horse fountains	26,000
Total flow accounted for	938,210
Total flow unaccounted for	11,990
Miles of mains tested	28
Cost per mile	$163.26

Accounting and Stores.

October 3, 1918.

Sir: The following summary of work done by the division of accounts and stores for the fiscal year ended June 30, 1918, is submitted:

ACCOUNTS.

Your attention is invited to the expense account and other tables herewith, showing in detail the cost of operating the department, and the following statement showing the volume of miscellaneous office work done:

Vouchers passed	2,417
Requisitions made	502
Letters mailed	818
Official letters written	573
Work orders issued	1,591
Files received and forwarded	1,270
Pay rolls made	996
Miscellaneous papers handled	51,965
Records made on cards	1,468
Letters filed	2,091
Transfer vouchers made	486
Total	63,907

STOREKEEPING.

A résumé of the work done by this branch, under the supervision of Mr. W. V. Robertson, is here submitted. I desire to call your attention to the excellent record made in the economical and efficient administration of the business of this important branch of this division.

The value of material and equipment received and issued during the year was as follows:

Material:	
Receipts	$380,113.88
Issues	321,578.56
Equipment:	
Receipts	42,414.29
Issues	5,439.46

The following table shows these values for the past four years:

Year.	Material.		Equipment.	
	Receipts.	Issues.	Receipts.	Issues.
1915	$244,152.74	$264,838.36	$170,140.38	$1,915.94
1916	255,174.17	254,945.05	23,461.60	30,379.82
1917	340,157.19	331,880.02	10,732.97	4,748.69
1918	380,113.88	321,578.56	42,414.29	5,439.46

The total value of material on hand at end of the year was $208,547.21, and the total value of equipment in storerooms and in service was $689,199.77.

STOREKEEPING.

The cost of operating the storekeeping branch for the year was 3.13 per cent of the value of the material issued and equipment disposed of. The cost of operating the storerooms for the past four years has been as follows:

	Per cent.
1915	4.676
1916	4.64
1917	3.91
1918	3.13

A comparison is invited of this cost with the cost of operating similar storekeeping divisions within the District of Columbia government.

I desire to again express my appreciation of the whole-hearted cooperation the employees of this division have given.

SAMUEL RIGGS,
Clerk in Charge of Accounting Division.

The SUPERINTENDENT WATER DEPARTMENT,
District of Columbia.

TABLE I.—*Statement of cash account of the water fund, District of Columbia, including appropriations and outstanding obligations, for the fiscal year ended June 30, 1918, as shown on the books of the auditor, District of Columbia.*

Balances July 1, 1917:		
Cash in Treasury of the United States	$165,602.94	
Cash in hands of collector of taxes, District of Columbia	198.27	
Cash in hands of disbursing officer, District of Columbia	15,553.34	
		$181,354.55
Receipts for year:		
Water rents	714,388.28	
Taps and stopcocks	3,705.65	
Water-main assessments	32,522.11	
Interest	2,127.35	
Sale of old material	458.96	
		753,202.35
Repayments for year:		
Credit transfers, 1918	20,756.23	
Repayments	18,983.12	
Credit transfers, 1917	3,389.86	
Repayments	1,262.38	
		44,391.59
Total		978,948.49
Expenditures for year:		
Appropriation, water department, District of Columbia, 1918—		
Salaries—		
Revenue and inspection branch	34,901.94	
Distribution branch	53,828.54	
Contingent expenses	3,610.73	
General expenses	21,138.73	
High service	339,303.36	
Refunds	1,516.51	
		454,299.81
Appropriation, water department, District of Columbia, 1917—		
Salaries, distribution branch	28.13	
Contingent expenses	1,006.86	
General expenses	19,066.84	
High service	96,181.52	
		116,283.35
Appropriation, water department, District of Columbia, 1916—		
High service		19,984.60
Total water department expenditures		590,567.76
Advances account appropriation for—		
Washington Aqueduct, District of Columbia, 1918	183,600.00	
Washington Aqueduct, District of Columbia, 1917	5,000.00	
		188,600.00
Balances June 30, 1918:		
Cash in Treasury of the United States	192,098.14	
Cash in hands of collector of taxes, District of Columbia	308.67	
Cash in hands of disbursing officer, District of Columbia	7,373.92	
		199,780.73
Total		978,948.49
Balance in water fund, as stated above		199,780.73
Less appropriation balances:		
Water department, District of Columbia—		
1916	17,546.45	
1917	15,293.33	
1918	94,786.05	
Washington Aqueduct, District of Columbia, 1918	32,000.00	
Emergency fund, Washington Aqueduct, District of Columbia, 1918	5,000.00	
		164,625.83
Unobligated balance, June 30, 1918		35,154.90

TABLE II.—*Cost of work done by the water department for the year ended June 30, 1918.*

Heads of expenditures.	Per diem and salaries.	Material expended, cuts, and transportation.	Total expenditures.	Charged to general account.				Stable accounts, Dr.
				New work.	Operating expenses.	General repairs.	Replacement of old work.	
Water surveys (detection of leaks)	$22,132.51	$2,438.41	$24,570.92	$1,121.04	$23,449.88			
Installation and maintenance of meters	16,764.51	19,561.17	36,325.68	23,195.40	13,130.28			
Office of water registrar	52,088.64	6,420.72	58,509.36		58,509.36			
Inspection and repair of services	31,498.21	6,265.47	37,763.68			$37,763.68		
Tapping water mains	2,184.41	1,607.31	3,791.72	3,791.72				
New services installed	1,220.25	1,700.85	2,921.10	2,921.10				
Engineering	25,439.78	840.96	26,280.74		26,280.74			
Stable and hauling account	21,706.35	8,061.25	29,767.60					$29,767.60
Operation and repair, valves, fire hydrants, etc	20,549.85	5,584.28	26,134.13		17,186.99	8,947.14		
New street hydrants and fountains erected	276.41	775.78	1,052.19	1,052.19				
Water mains laid	10,777.66	26,805.14	37,582.80	37,582.80				
Repairs to leaks	16,916.80	5,822.17	22,738.97			22,738.97		
Maintenance, reservoirs, lodges, towers	2,372.00	1,274.94	3,646.94		2,178.92	1,468.02		
Care of grounds	5,061.47	265.63	5,327.10		5,327.10			
Repayment and special appropriation work	26,911.65	98,481.52	125,393.17	125,393.17				
Replacement work, lowering mains, etc	3,449.47	4,491.12	7,940.59				$7,940.59	
Plans, estimates, and tests	13,725.56	436.21	14,161.77		14,161.77			
Care of Bryant Street pumping station	12,908.32	2,133.98	15,042.30		12,713.57	2,328.73		
Operation and repair, pumps:								
Bryant station	30,392.62	58,644.44	89,037.06		80,090.11	8,946.95		
Reno station	3,415.59	1,647.26	5,062.85		4,899.19	163.66		
Anacostia station	5,061.82	2,962.52	8,024.34		7,561.69	462.65		
Shopwork	17,979.04	10,147.42	28,126.46	18,875.19		9,251.27		
Outside offices	4,794.29	934.01	5,728.30		5,728.30			
Gross expenditures	347,627.21	267,302.56	614,929.77	213,932.61	271,217.90	92,071.07	7,940.59	29,767.60

SUMMARY.

Expenditures:	
Per diem pay rolls	$259,002.92
Salary pay rolls	88,624.29
Total services	347,627.21
Material expended, cuts, etc	267,302.56
Gross expenditures	614,929.77
Less transportation credit	29,767.60
Net expenditures	585,162.17

Charged to—		Per cent
New work	$213,932.61	36.6
Operating expenses	271,217.90	46.3
General repairs	92,071.07	15.7
Replacement work	7,940.59	1.4
Net expenditures	585,162.17	100.0

TABLE III.—*Statement of the distribution system, including mains laid by the United States, the District of Columbia, and on account of repayment work.*

	In service June 30, 1917.	Laid during year ended June 30, 1918.	Abandoned during year ended June 30, 1918.	In service June 30, 1918.
Diameter:				
3-inch.....linear feet..	82,262	942	329	82,875
4-inch.....do....	153,365	1,033	12	154,386
6-inch.....do....	1,467,682	1,986	1,492	1,468,176
8-inch.....do....	862,423	13,046	752	874,717
10-inch.....do....	9,109	16	18	9,107
12-inch.....do....	376,781	4,900	88	381,593
16-inch.....do....	17,866	5,799	.....	23,665
20-inch.....do....	113,033	8	5	113,036
24-inch.....do....	26,408	.....	.....	26,408
30-inch.....do....	57,995	.....	.....	57,995
36-inch.....do....	59,437	5	5	59,437
42-inch.....do....	23	.....	.....	23
48-inch.....do....	44,172	.....	.....	44,172
75-inch.....do....	600	.....	.....	600
Total.....	3,271,156	27,735	2,701	3,296,190
Stop valves.....	10,384	298	71	10,611
Fire hydrants.....	3,499	109	60	3,548
Public hydrants.....	229	21	23	227
Sanitary fountains.....	18	.....	1	17
Horse fountains.....	153	6	3	156
Public wells:				
Deep.....	42	.....	.....	42
Shallow.....	4	.....	.....	4

TABLE IV.—*Statement of the length and cost of water mains laid from July 1, 1878, to June 30, 1918, paid from water department funds.*

	In service June 30, 1917.	Laid during year ended June 30, 1918.	Abandoned during year ended June 30, 1918.	In service June 30, 1918.
Diameter:				
3-inch.....linear feet..	77,151	.....	329	76,822
4-inch.....do....	116,620	328	10	116,938
6-inch.....do....	1,080,129	98	125	1,080,102
8-inch.....do....	809,372	8,908	443	817,837
10-inch.....do....	6,741	16	18	6,739
12-inch.....do....	336,992	3,090	37	340,045
16-inch.....do....	17,940	.....	.....	17,940
20-inch.....do....	102,970	5	5	102,970
24-inch.....do....	14,494	.....	.....	14,494
30-inch.....do....	20,437	.....	.....	20,437
36-inch.....do....	38,248	.....	.....	38,248
42-inch.....do....	23	.....	.....	23
48-inch.....do....	14,309	.....	.....	14,309
Total.....	2,635,426	12,445	967	2,646.904

Total cost to June 30, 1917.....	$3,913,996.61
Total cost for year ended June 30, 1918.....	37,582.80
Aggregate cost to June 30, 1918.....	3,951,579.41

REPORT OF THE WATER REGISTRAR.

WASHINGTON, D. C., *October 1, 1918.*

SIR: I have the honor to submit the annual report of the revenue and inspection branch of the water department showing in detail the work accomplished during the fiscal year ended June 30, 1918.

INSTALLATION OF METERS.

Owing to the increased cost of meters and material, as well as the scarcity of labor, the work of installation of meters consisted only of metering services of new houses in some of those sections of the city which had previously been metered.

The number of meters installed during the year was 986 and the number discontinued was 217, making a total now in use 61,107.

The following shows the average cost of installing a meter:

Meter	$6.38
Material	5.63
Labor	3.75
Total	15.76

LEAKS AND WASTES.

During the year 28,720 examinations for leaks were made. This included ordinary leaks at house fixtures and the more complicated cases of underground leaks, the detection of which required considerable time and the employment of experienced men.

In all, 265 water services were disconnected at the tap in the main.

The water supply was cut off from 4,404 houses this year during the period of vacancy, which has resulted in the saving of considerable water and has prevented the reoccupying of those houses without the knowledge of the office, thereby insuring full payment for the time water was used.

During the year 722 taps and curb cocks were located.

SERVICE CONNECTIONS.

There were 725 new service connections made, inspected, and locations recorded during the year; also, 1,317 repairs, etc., to water services and appurtenances were inspected and recorded.

This work has been handled by the regular inspector with some assistance from the office force, and inspections have been made in the majority of cases within one hour of the time specified by the plumber doing the work.

Owing to the reduction in the number of new service connections, the tapper and assistant tapper have been used in connection with leaks and wastes and the taking out and replacing of meters, thus keeping these branches of the work up to date. This detail did not occasion any loss of time in connection with the tapping of water mains and saved the employment of more men in the subdivision to which the assistance was given.

REVENUES.

The table of comparative revenues shows a total collection of $797,593.94.

There has been a drop in the revenues for water this year, which is partly attributable to the decrease in building operations and the consequent lessening of the number of new services installed and also to the change in the charge for water from the flat rate to the meter rate, a loss which was fully anticipated. From this it will be seen that meters have proved of considerable benefit to the consumers in general from a financial point of view, and their installation has been of the greatest value to the District of Columbia in cutting down the waste of water.

Table 1 shows statement of collections and expenditures.

Table 2 shows comparative statement of revenues.

Table 3 shows number of meters in service.

Table 4 shows consumption of water in buildings owned or controlled by the District of Columbia.

Table 5 shows consumption of water in charitable institutions, hospitals, etc., which receive an allowance of free water.

Table 6 shows general information.

WATER RATES.

There has been no change in the water rates during the past year. The rate for domestic purposes is charged according to stories and front feet. On all tenements two stories high with a frontage of 16 feet or less, $5 per annum; for each additional front foot or fraction thereof, one-third of the charges as computed above.

Business premises are rated according to their size, class, volume of business, and water facilities, and rate from $1 to $25. If the flat rate on business establishments

reaches $25 or more, the owner or occupant is required to install a water meter at his own expense.

Meter rates.—A minimum rate of $4.50 is charged against all consumers supplied with water through meters, which allows the use of 7,500 cubic feet of water during the fiscal year, water used in excess of this quantity being charged for at the rate of 4 cents per 100 cubic feet.

CONDITION OF THE WORK.

Notwithstanding the fact that there has been a large increase in business over that of previous years, owing to the change from the flat rate to the meter system, the condition was met without any addition to the force and the work was up to date at the close of the year.

This result was obtained by the faithful cooperation of the employees, for which I now take pleasure in expressing my appreciation.

Very respectfully,

GEO. W. WALLACE, *Water Registrar.*

The SUPERINTENDENT WATER DEPARTMENT.

TABLE 1.—*Statement of collections and expenditures.*

Water rents:	
Flat rate	$73,888.97
Meters	637,695.98
Building purposes	2,803.33
Total	714,388.28
Water main tax, principal and interest	34,649.46
Taps and stopcocks	3,705.65
Miscellaneous receipts	458.96
Total	38,814.07
Total receipts	753,202.35
Repayments, deposits, and special appropriations	44,391.59
Total receipts and repayments	797,593.94

TABLE 2.—*Statement of cash receipts and expenditures of the water fund, District of Columbia, for the fiscal years from June 30, 1903, to June 30, 1918.*

Year.	Water rents.	Water main tax, principal and interest on same.	Taps and stopcocks.	Miscellaneous receipts.	Repayments, deposits, and special appropriations.	Total receipts and repayments balance brought forward.
1903						$341,337.37
1904	$341,947.53	$51,713.64	$6,522.67	$865.26	$16,074.20	417,123.30
1905	352,156.93	32,217.84	8,603.80	2,819.95	27,652.46	423,450.98
1906	362,266.54	34,395.76	9,100.00	23.60	25,187.61	430,873.51
1907	468,889.47	51,319.62	9,487.10	6,254.73	19,912.51	555,863.43
1908	479,981.22	57,462.39	8,688.10	1,376.24	47,984.45	595.492.40
1909	502,894.45	57,654.06	10,674.15	1,530.08	49,875.59	622,628.33
1910	509,769.23	76,905.15	11,794.78	1,715.20	26,498.58	626,682.94
1911	521,581.78	101,987.53	8,824.35	960.04	94,520.49	727,974.19
1912	545,405.47	122,458.81	11,438.65	2,817.50	110,441.39	792,561.82
1913	640,008.64	138,693.75	8,685.50	3,153.81	14,923.91	805,465.61
1914	646,296.15	86,379.21	6,118.20	4,253.20	24,131.64	767,178.40
1915	638,861.89	66,107.56	6,559.89	3,532.77	14,513.50	729,575.61
1916	624,882.18	64,647.80	7,020.80	1,761.39	24,669.76	722,981.93
1917	636,664.31	61,990.43	5,484.62	2,019.58	25,551.56	731,710.50
1918	714,388.28	34,649.46	3,705.65	458.96	44,391.69	753,202.35
Total	7,985,994.07	1,038,583.01	122,708.26	34,542.31	552,815.74	9,314,627.06
1919[1]	715,000.00	30,000.00	3,000.00	500.00		[2] 748,500.00
1920[1]	700,000.00	30,000.00	3,000.00	500.00		[2] 733,500.00

[1] Estimated.

[2] Estimated total revenue.

TABLE 3.—*Water meters.*

Name.	⅝-inch.	¾-inch.	1-inch.	1½-inch.	2-inch.	3-inch.	4-inch.	6-inch.	8-inch.	Total.
American	166	2	11	6	2	.....	.....	.....	.....	187
American, new model	85	.....	.....	.....	.....	.....	.....	.....	.....	85
Crown	1	11	32	25	9	8	.....	2	.....	88
Empire	46	17	4	1	4	2	1	.....	.....	75
Enare	.....	20	28	39	17	.....	.....	.....	.....	104
Eureka	.....	.....	.....	.....	.....	1	1	.....	.....	2
Gamon	37	.....	.....	.....	.....	.....	.....	.....	.....	37
Gem	.....	.....	.....	.....	21	16	9	1	.....	47
Hersey disk	.....	600	46	98	24	18	8	2	.....	796
Hersey, model F	22,003	.....	.....	.....	.....	.....	.....	.....	.....	22,003
Hersey torrent	.....	.....	.....	.....	1	2	2	.....	.....	5
Hersey detecter	.....	.....	.....	.....	.....	6	6	9	3	24
Keystone, Pittsburgh	.....	49	51	33	19	27	4	.....	.....	183
Keystone, model W	12,283	.....	.....	.....	.....	.....	.....	.....	.....	12,283
King	149	.....	3	7	1	.....	.....	.....	.....	160
Lambert	1,174	173	123	115	64	28	7	1	.....	1,685
Lambert special	448	.....	.....	.....	.....	.....	.....	.....	.....	448
Lambert glass lid	68	.....	.....	.....	.....	.....	.....	.....	.....	68
Nash	120	236	360	257	121	43	16	1	.....	1,154
Niagara	1	60	79	105	56	7	.....	.....	.....	308
Standard	.....	.....	.....	4	.....	.....	.....	.....	.....	4
Thomson	1	8	21	25	18	1	1	.....	.....	75
Trident disk	2,407	91	114	101	28	2	.....	.....	.....	2,743
Trident crest	.....	.....	.....	.....	.....	7	17	1	.....	25
Trident compound	.....	.....	.....	.....	.....	3	1	.....	.....	4
Union	.....	2	6	3	1	.....	.....	.....	.....	12
Worthington	251	54	55	47	25	28	7	3	.....	450
Worthington model D	39	.....	.....	.....	.....	.....	.....	.....	.....	39
Worthington model G (old)	87	.....	.....	.....	.....	.....	.....	.....	.....	87
Worthington model G (new)	4,532	.....	.....	.....	.....	.....	.....	.....	.....	4,532
Worthington model K	13,389	.....	.....	.....	.....	.....	.....	.....	.....	13,389
Total	57,289	1,323	933	866	411	199	80	20	3	61,102
Registers	.....	.....	.....	.....	.....	.....	.....	.....	.....	5
Total meters and registers	.....	.....	.....	.....	.....	.....	.....	.....	.....	61,107

TABLE 4.—*Showing consumption of water in buildings owned or controlled by the District of Columbia.*

	Annual consumption.	Premises.	Meters.
	Cubic feet.		
Schools and annexes	49,766,500	144	149
Fire-engine houses, etc	3,239,600	40	37
Police stations	4,003.716	14	14
Playgrounds	8,473,536	6	9
Public-comfort stations	2,468,400	3	3
Stables	2,249,484	5	9
Workhouse grounds	908,844	7	7
Industrial schools	929,400	2	5
Miscellaneous	6,618,000	27	38
Total	78,657,480	248	271

TABLE 5.—*Premises which receive an allowance of free water.*

Premises.	Consumption.	Allowance.	Exceeded.	Paid.	Meters.
	Cubic feet.	*Cubic feet.*			
Churches	3,100,000	6,266,500	9	$208.40	109
Homes	3,760,000	4,292,800	7	256.80	29
Hospitals	11,128,000	10,949,200	6	816.50	14
Neighborhood houses	59,100	482,400	.....	.....	4
Orphan asylums	2,821,600	4,568,100	.....	.....	12
Schools	2,379,100	6,372,800	1	118.46	14
Total	23,247,800	32,931,800	23	1,400.16	182

TABLE 6.—*General information.*

Average cost of installing a water meter by the department:		
Meter		$6.38
Material		5.63
Labor		3.75
Total		15.76
Cost of labor and material for mainenance of meters		$14,783.000
Average cost per meter for maintenance		.24
Consumption of water through meters:		
District meters	cubic feet	593,442,600
District meters Municipal Buildings	do	78,022,700
Private meters	do	620,388,300
Private meters in charitable institutions	do	23,247,800
Total		1,315,101,400

Meters in service.	In use June 30, 1917.	Installed, 1918.	Abandoned, 1918.	Total in use June 30, 1918.
District meters	7,069	865	109	57,825
District meters in Municipal buildings	266	2	3	265
Private meters	2,821	119	105	2,835
Private meters in charitable institutions	182			182
Total	60,338	986	217	61,107

Average cost of reading meters		$0.18
Average cost of computing and making bills		.16
Average payment for premises in which meters were installed		6.32
Average payment for flat-rate accounts		7.21
Difference		89
Revenue:		
For metered water—		
District of Columbia meters	$365,866.56	
Private meters	271,829.42	
		$637,695.56
For flat-rate accounts—		
Water rents	73,888.97	
Building purposes	2,803.33	
		26,682.30
Total revenues for the fiscal year 1917		714,388.26
Water services:		
In use June 30, 1917	70,475	
Installed, 1918	725	
		71,200
Abandoned, 1918		266
In use June 30, 1918		70,935
Metered		61,107
Not metered		9,828
Percentage of services metered		86

REPORT OF THE SUPERINTENDENT OF SEWERS.

WASHINGTON, D. C., *September 10, 1918.*

SIR: I have the honor to submit the following report of the division of sanitary engineering, engineer department, District of Columbia, for the fiscal year ending June 30, 1918.

Division A.—Drainage Studies, Plans, Engineering Data, etc.

Drainage studies for the future development of the sewerage system were continued throughout the year by advance studies and surveys in various suburban areas. Studies were made for the following new trunk lines and important extensions: For sanitary drainage and separate system sewerage for newly developed areas in Hillbrook, Kenilworth, Bennings, and Pinehurst; also detailed studies were made for sanitary sewers in Brookland, Petworth, Upper Piney Branch Valley and Twining City. In portions of the old system, studies were made for improving the drainage, where existing sewers were inadequate and obsolete, and new sewers were built in the more urgent cases where funds would permit.

Storm drainage studies for areas in Klingle Valley, Connecticut Avenue Heights, North Brookland, and for the extension of several of the main drainage lines along the east shore of the Anacostia River were in progress during the year. Detail plans were prepared for the Cleveland Avenue and Calvert Street, the Reno Road, the Klingle Valley, the Delafield Place, South Illinois Avenue, and North Petworth trunk sewers; and also for the extension of the Easby Point High Level intercepting sewer to the newly established bulkhead line of the Potomac River.

Plans were prepared for trunk sewers in Klingle Valley between Rock Creek and Connecticut Avenue, Reno Road between Macomb and Newark Streets, East Brookland from Eighteenth and Newton to Fifteenth and Hamlin Streets; also for a sanitary concrete channel in the 30-foot Span Tiber sewer extending from Missouri Avenue and Third Street, NW. to Second and C Streets SW.

In connection with the enlargement of the sewage disposal system, plans were prepared for the upper Potomac interceptor from Thirty-fourth to Thirty-seventh Streets NW., and for the special deep section of this interceptor crossing under Rock Creek and the Chesapeake & Ohio Canal between Twenty-seventh and Twenty-ninth Streets.

Plans were prepared for the Rock Creek pumping station, which will deliver the entire sanitary flow from the Potomac valley area west of Rock Creek to the sewage disposal system including machinery and equipment. This pumping station will be located at Twenty-seventh and K Streets NW. and will be provided with electric pumping units automatically controlled.

Detail studies were in progress for the upper Anacostia interceptor, which will extend along the easterly bank of the Anacostia River from Bennings to the District line where it will receive the drainage from the intercepting system of the metropolitan sanitary district of Maryland, thus completely removing all sewage from this stream, which flows for 5 miles through the Anacostia valley parkway.

Among the special duties assigned to this division, work was continued during a portion of the year on the location of and details of installation of steam tunnels, steam laterals, and electric conduits for the United States central, heating, lighting, and power plant, including plans and locations for vapor cooling tanks, as well as necessary changes in existing underground structures to permit this installation. Throughout the year the underground construction of the public service corporations was supervised, details of which are set forth under section G of this report.

Records of the operating and mechanical plants of the sewer department have been analyzed and results tabulated during the year. The comparative study of unit costs, both of construction work and of operation, were continued during the year. Monthly record charts showing the daily water consumption of the department's mechanical plants were prepared and these records carefully analyzed with a view of limiting the water consumption to the least possible quantity consistent with proper sanitary maintenance.

The engineering data for the year included rainfall, run-off, and river flow records, and the determination of the oxygen content of the river waters in connection with the sewage disposal in the Potomac River; also bacteriological examination and sanitary study of all streams entering the District of Columbia to record the degree of their pollution by the sewage entering same from the sewerage systems of the adjacent Maryland towns.

RAIN FALL AND RUN-OFF.

In connection with run-off studies, complete rainfall records were obtained during the year from 24 rain gauges distributed over 50 square miles of area. Discharge and flow line measurements were secured in a number of the trunk drainage lines for the excessive storms of the year.

But three storms of unusual intensity were recorded. The greatest rate of rainfall occurred May 13, 1918, when three-quarters of an inch of rain fell in 20 minutes.

The following tabulations give the total rainfall for the three excessive storms of the year, as recorded at each of the 24 gauges, the rates and amounts of precipitations, and the annual rainfall by months:

Tabulation of the total observed rainfall for three excessive storms of the fiscal year 1918 as recorded at 24 stations.

Station No.	Location.	Radial distance in miles.	Total rainfall.		
			July 2, 1917.	July 25, 1917.	May 13, 1918.
1	Pennsylvania Avenue and Thirteenth Street NW	0.00	2.20	2.98	.95
2	Tenth and G Streets SW	.40	2.10	1.00	.92
3	Seventeenth and K Streets NW	.60	2.00	3.30	1.00
4	Twenty-fourth and M Streets NW	1.20	2.17	3.27	1.00
5	Delaware Avenue and C Street NE	1.20	(1)	(1)	(1)
6	New York Avenue and New Jersey Avenue NW	1.20	2.00	1.90	1.05
7	Seventeenth and U Streets NW	1.40	2.35	3.52	1.12
8	North Carolina Avenue and Seventh Street SE	1.90	1.92	.88	.75
9	Rock Creek and Massachusetts Avenue NW	2.00	2.62	3.50	(1)
10	First and O Streets SE	2.10	1.60	.79	.64
11	Dent Place and Thirty-fifth Street NW	2.20	2.75	2.50	.75
12	Filtration Plant	2.20	2.48	3.15	.95
13	Maryland Avenue and Thirteenth Street NE	2.30	2.80	.50	1.00
14	Zoological Park	2.40	2.75	4.00	.14
15	Park Road and Holmead Place NW	2.40	2.62	3.25	.88
16	Twenty-first and A Streets NE	3.00	1.70	.81	.58
17	Fourteenth and V Streets SE	3.00	2.35	.12	1.00
18	Twelfth and Monroe Streets NE	3.30	2.25	.80	1.05
19	Fourth Street and Nichols Avenue SE	3.90	1.50	.45	1.12
20	Nebraska Avenue and Tunlaw Road NW	4.20	2.42	.63	(1)
21	Georgia Avenue and Nicholson Street NW	4.40	2.75	2.78	.78
22	Minnesota Avenue and Gault Place NE	4.70	1.95	1.00	.75
23	Conduit Road and Little Falls Road NW	5.10	3.10	1.00	.78
24	Great Falls, Md	16.00	2.55	3.15	.35

[1] No record.

Excessive storm of May 13, 1918.

DEPTH OF PRECIPITATION.

[Depth in inches at time indicated.]

Gauge.	3.10	3.15	3.20	3.25	3.30
No. 4, Twenty-fourth and M Streets NW	0.00	0.33	0.55	0.68	0.74
No. 10, First and O Streets SE	.00	.10	.25	.28	.30
No. 16, Twenty-first and A Streets NE	.02	.18	.23	.25	.30

RATE OF PRECIPITATION.

[Rate in inches per hour during periods of time indicated.]

Gauge.	5 minutes.	10 minutes.	15 minutes.	20 minutes.	25 minutes.
No. 4, Twenty-fourth and M Streets NW	0.00	3.96	3.30	2.72	2.22
No.10, First and O Streets SE	.00	2.16	1.38	1.00	.72
No. 16, Twenty-first and A Streets NE	.24	1.08	3.00	1.68	.72

MAXIMUM PRECIPITATION.

[Depths in inches during periods of time indicated.]

Gauge.	5 minutes.	10 minutes.	15 minutes.	20 minutes.	25 minutes.
No. 4, Twenty-fourth and M Streets NW	0.00	0.33	0.55	0.68	0.74
No. 10, First and O Streets SE	.00	.10	.25	.28	.30
No. 16, Twenty-first and A Streets NE	.02	.18	.23	.25	.30

The precipitation by months for the fiscal year was recorded as follows:

1917	Inches.	1918	Inches.
July	9.41	January	4.29
August	.77	February	.83
September	1.34	March	5.04
October	4.81	April	6.58
November	.53	May	2.35
December	1.47	June	2.06
		Total	39.48

RIVER FLOW AND SEWAGE DISPOSAL.

The main sewage outfalls of the disposal system at Grimes, on the Potomac River, were under observation throughout the year and the river conditions in the vicinity were given careful study. The condition of river waters at and below the outfalls was generally very good, and throughout the year was fair. No evidences of sludge depositing were disclosed, the beaches in the vicinity of the outfalls were quite clean, and the river surface at all times substantially free from the objectionable sleek of oil or grease as well as floating matter. Yet, in all of these respects conditions were progressively less favorable than in previous years, and in other important particulars the deterioration was somewhat more apparent, particularly in the drop in oxygen content, which is recorded elsewhere, and in the presence at times of noticeable and objectionable odors. These conditions indicate the need in the near future of the installation of sewage treatment works. The first step in this direction is the acquiring of suitable land for these works, and very considerable time has been given to the physical study of areas available, their mapping and platting, so that prompt action could be taken under the authority granted by Congress in the appropriation act for the fiscal year 1919, which provides for the purchase of lands for this purpose. In laying down the principles which will govern the design of these sewage-treatment works, it should not be considered necessary to install works which will secure a high degree of sewage purification, as this would involve an extraordinary expenditure, both for construction and operation, not justified by the local conditions. It is proposed first to establish a reasonable constant as to the amount of organic matter which will be made dependent on the river waters for purification and then to remove the excess beyond this constant by means of these artificial works. The natural conditions which permit the effective disposal of a very large volume of sewage are unusually favorable, as shown by the recent elaborate and thorough investigation of the United States Public Health Service (see Report No. 104 U. S. Public Health Service), and these should be supplemented to the extent necessary to maintain this constant (i. e., the total volume of organic matter dependent on the river waters for purification), probably at somewhat less than the load carried by the river during the fiscal year 1914, when conditions in all respects were highly satisfactory.

The following is a tabulation of the flow of the Potomac River for each month of the year together with the average discharge through the outfall. The latter includes considerable storm water, ground water, and stream flow from suburban areas, as well as leaks and wastes of the water-supply system. The actual ratio to river flow is given in this tabulation, as well as the ratio of effective dilution obtained:

River flow, ratio to pumpage and dilution ratio.

Month.	River flow.			Mean pumpage.[1]	Mean pumpage to mean river flow (ratio).	Effective dilution[2] obtained.
	Maximum.	Minimum.	Mean.			
1917.	*Sec.-feet.*	*Sec.-feet.*	*Sec.-feet.*	*Sec.-feet.*		
July	8,400	2,875	4,944	94	1:52	287:1
August	4,700	1,287	3,319	97	1:34	192:1
September	2,750	800	1,700	90	1:19	96:1
October	37,550	960	6,000	91	1:66	335:1
November	22,875	1,575	4,780	91	1:53	262:1
December	6,325	2,075	3,629	86	1:42	196:1
1918.						
January	[3]	[3]	[3]	104	[3]	[3]
February	80,875	12,000	40,990	101	1:406	2146:1
March	54,400	7,100	16,636	100	1:166	857:1
April	139,000	17,375	50,235	108	1:465	2550:1
May	20,000	3,675	7,750	109	1:71	387:1
June	7,180	2,750	4,150	103	1:40	204:1

[1] Pumpage includes ground water, dry weather flow of small suburban streams, etc.
[2] The mean effective dilution ratio represents the ratio of 30 gallons per capita per day to the daily volume of river flow in gallons divided by the contributing population.
[3] Owing to severe winter no river gaugings recorded in January.

During the past 12 months the river flow has fallen below 1,000 second-feet on 4 days, below 1,200 second-feet on 14 days, below 1,400 second-feet on 24 days, below 1,600 second-feet on 36 days, below 1,800 second-feet on 44 days and below 2,000 second-feet on 51 days. The minimum flow was 800 second-feet on September 29, 1917, and the maximum flow was 139,000 second-feet on April 16, 1918. The mean flow for the

year was 11,000 second-feet. The minimum flow for the preceding year was 1,200 second-feet, the maximum flow 113,125 second-feet, and the mean flow 8,475 second-feet. While the mean annual flow was above normal, the condition of one-eighth of the entire year with the river flow below 2,000 second-feet was dinstinctly unfavorable to effective disposal by dilution of the present greatly increased volume of sewage.

TIDAL RANGE.

The automatic recording gauge located at the main sewerage pumping station, on the Anacostia River, about 1½ miles above its junction with the Potomac River, indicated the following for the fiscal year: Maximum high water, December 10 and 11, 1917, 4 feet, or 3.3 feet above normal; minimum low water, December 12, 1918, −4 feet, or 1.8, feet below normal.

The maximum range of tide for each month of the fiscal year was as follows:

Maximum monthly range of tides.

1917.	Tidal range in feet.	1918.	Tidal range in feet.
July	4.7	January	3.9
August	5.2	February	6.0
September	4.8	March	5.0
October	4.8	April	6.0
November	5.7	May	4.3
December	8.0	June	5.2

OXYGEN CONTENT OF THE RIVER WATERS.

During the year dissolved oxygen tests were made to determine the condition of the river waters in the vicinity of the main sewage outfall, and similar determinations for comparison were made on samples taken in the upper river above the area affected by the discharge of the city sewage. The following table gives the maximum, minimum, and mean results of these oxygen tests:

Comparative oxygen tests of samples of Potomac River water taken near main sewage outfall and from the upper river for the past three calendar years.

Year.	Location of samples taken on Potomac River.	Oxygen per cent saturation.											
		Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
	Mean:												
1915	Dilution basin..	(1)	(1)	100	93	85	90	(1)	(1)	86	88	85	96
	Upper river.....	(1)	(1)	100	100	99	98	(1)	(1)	94	95	97	100
1916	Dilution basin..	100	(1)	100	95	86	93	87	77	73	74	74	90
	Upper river.....	100	(1)	99	98	97	92	93	93	88	95	98	100
1917	Dilution basin..	100	(1)	100	97	79	83	64	65	70	64	(1)	91
	Upper river.....	100	(1)	93	98	96	96	87	90	92	94	(1)	97
	Minimum:												
1915	Dilution basin..	(1)	(1)	98	74	77	80	(1)	(1)	74	76	73	95
	Upper river.....	(1)	(1)	99	100	98	93	(1)	(1)	91	91	94	100
1916	Dilution basin..	100	(1)	99	92	73	86	78	74	63	65	65	83
	Upper river.....	100	(1)	100	98	94	84	87	87	81	91	97	100
1917	Dilution basin..	100	(1)	100	94	60	73	43	55	55	59	(1)	91
	Upper river.....	100	(1)	97	96	92	92	81	86	89	84	(1)	97
	Maximum:												
1915	Dilution basin..	(1)	(1)	100	100	96	100	(1)	(1)	98	100	97	97
	Upper river.....	(1)	(1)	100	100	100	100	(1)	(1)	98	100	100	100
1916	Dilution basin..	100	(1)	100	98	100	100	96	80	84	84	84	98
	Upper river.....	100	(1)	100	99	100	100	100	99	95	100	100	100
1917	Dilution basin..	100	(1)	100	100	98	93	77	77	79	74	(1)	91
	Upper river.....	100	(1)	100	100	100	100	93	94	96	96	(1)	97

[1] Determinations interrupted. On account of war work no determinations could be made for the department by the United States Public Health Service during the half year ending June 30, 1918.

The most striking indication from this tabulation of the effect of the increasing burden being placed on the river waters by the growing volume of sewage discharged therein, is found in the mean oxygen content record for October for the past three years. With the per cent of saturation of the waters of the upper river a constant (about 95 per cent), the mean content in the dilution basin fell from 88 per cent in 1915 to 74 per cent in 1916, and to 64 per cent in 1917. The approaching need of sewage purification works becomes increasingly apparent.

AVERAGE FLOW POTOMAC RIVER IN SECOND-FEET.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1915.....	34,368	33,853	10,341	5,449	7,350	25,398	3,343	8,418	6,668	8,820	4,500	8,332
1916.....	15,285	19,416	31,126	24,892	9,983	17,625	8,958	4,578	3,015	2,849	1,940	3,766
1917.....	11,600	9,321	30,309	10,018	7,020	9,849	4,830	3,370	1,700	6,000	4,780	3,630
1918.....	(1)	40,990	16,630	50,230	7,760	4,150	.....	.....	.....	.....	.....	.....

[1] No record on account of ice.

METROPOLITAN SEWERAGE DISTRICT.

War conditions have prevented the beginning of construction on the systems of sewerage and interceptors in the Maryland areas contiguous to the District, which have been designed with a view of removing the sewage from neighboring Maryland towns now seriously polluting the several streams flowing into the District, which are not only such important features of the park system, but traverse closely built-up sections of the city itself, with their contaminated waters at the doors of hundreds of dwellings. Much, however, has been accomplished in the way of planning and organization, and it is felt that a secure foundation has been laid for the realization of this important cooperative plan for sanitary betterment between the District of Columbia and the State of Maryland, which was originally advised in my annual report for the fiscal year 1909, from which the following is abstracted:

"The only practical solution of this problem is believed to be in the formation of a metropolitan district, under the control of a State and national board, with power to construct the necessary valley interceptors for the removal of the sewage, and that these interceptors be arranged so as to discharge at the State line into the interceptors of the sewage disposal system of the District of Columbia, the District to be reimbursed for the cost of pumping and handling the sewage from the Maryland towns and villages by a State-collected tax levied upon the communities benefited, which would also defray the cost of construction and maintenance of the State system.

"The present conditions are not such as to render this a matter of immediate urgency, but the population in these areas is quite rapidly increasing, so that for a subject so complicated, especially in the matter of jurisdiction and legislation, which will require a number of years to develop, it is believed not too soon to begin the study of the problem. The interests of the District are so immediate and the conservation of the purity of these streams so important for the protection of the park systems, and in the interest of the public health and sanitation, that it is respectfully recommended that a board be appointed to work in conjunction with such officials of the State of Maryland as may be designated for tentative consideration of the subject as soon as the necessary authority may be obtained."

The condition of the streams where they enter the District of Columbia has been under observation throughout the year, and the increase in their pollution by bacteriological determinations has been appreciable. These undesirable conditions are becoming more apparent on account of recent construction of sewerage systems in the bordering Maryland towns where sewage is discharged directly into these streams.

The following tabulation from bacteriological determinations of samples of stream waters from those collected by the sewer department shows the present pollution of these streams. The results given were obtained by the bacteriological laboratory of the United States Public Health Service. Acknowledgments are due to the Public Health Service for their valuable assistance in obtaining this data.

Bacteriological survey of streams, showing total bacteria and Bacilli coli per cubic centimeter in analysis of samples taken from streams as located.

Date.	Little Falls branch at Wisconsin Avenue.		Willets Brook at River Road.		Rock Creek at Broad Branch Ford.		Anacostia River, Bladensburg Road.	
	Total bacteria.[1]	Bacilli coli.	Total bacteria.[1]	Bacilli coli.	Total bacteria.[1]	Bacilli coli.	Total bacteria.[1]	Bacilli coli.
1917.								
Aug. 2	3,900	100	2,550	100	6,800	1,000	.....	.....
Aug. 20	.....	.....	.....	.....	.....	.....	15,050	10
Aug. 27	6,150	1,000	1,675	100	1,250	100	.....	.....
Sept. 11	1,280	100	830	10	540	100	.....	.....
Sept. 25	.....	100	1,000	100	.....	10	1,950	100
Oct. 5	1,100	100	167	10	787	100	.....	.....
Oct. 15	8,600	100	900	100	185	10	.....	.....
1918.								
Mar. 3	11,950	1,000	2,750	100	1,900	10	.....	.....
Mar. 20	.....	.....	.....	.....	.....	.....	510	100
Mar. 26	4,500	1,000	1,475	100	150	10	.....	.....
Apr. 25	19,000	1,000	3,900	100	12,500	100	.....	.....
May 17	.....	.....	.....	.....	.....	.....	3,200	100

[1] Total bacteria on agar 37°.

Division B.—Operation and Maintenance, Sewerage System.

The maintenance work of the year included the inspection of all main trunk sewers, 144.97 miles in length, and the inspection of 989.10 miles of pipe sewers. General repairs were made throughout the system on both main and pipe sewers, and their condition as to maintenance was excellent. The most important maintenance work included the construction of 810 linear feet of concrete floor in the B Street storm-water sewer, completing the same as far westward as Sixteenth Street. Minor repairs were made to the concrete and brick masonry of the following important trunk sewers: Old Tiber trunk, Sixth Street NW. trunk, Easby Point high-level interceptor, Seventeenth Street NW. trunk, and the Fourth Street SE. trunk sewers; also improvements and repairs were made to the storm-water outlet of the Piney Branch trunk sewer and a new concrete apron constructed.

The operating work for the fiscal year included the cleaning of 25,837 storm-water catchment basins on permanently paved streets and 4,644 catchment basins on suburban streets and roads. The total quantity of silt removed from the city basins was 4,117 tons and from suburban basins 4,646 cubic yards. This is a decrease of 1,237 tons from city basins and an increase of 1,838 cubic yards from suburban basins over the amounts removed during the preceding fiscal year. The cost of cleaning city basins, including the cost of labor and team haul but exclusive of disposal, was $11,267.26, and the cost of cleaning suburban basins was $3,518.01, a total of $14,785.27. The average cost of cleaning city basins was $0.436 per basin, as against $0.355 per basin, the cost for the preceding year, and the average cost per ton of silt removed was $2.74, as against $2.27, the cost for the preceding year. The average cost of cleaning suburban basins was $0.757 per basin, as against $0.598 per basin, the cost for the preceding year, and the average cost per cubic yard of material removed was $0.757, as against $0.97, the cost for the preceding year. All material from the city basins was delivered aboard scows, removed from the city front, and deposited as fill back of the bulkhead line of the Anacostia River improvement, between Poplar Point and Giesboro Point, under permit from the United States Engineer Office. The cost of this disposal, including loading on scows, water transportation, unloading, and grading, was $3,884.15, and the average cost of this work per ton removed was $0.943, as against $0.941, the cost per ton during the preceding year.

A total of 8,194 cubic feet of material was removed from sewers and 55,323 cubic feet from the settling chamber of the sewage-disposal system; 948,118 pounds of screenings were removed from the sewage screens and incinerated.

The following tabulation indicates the total length of sewers at the close of the fiscal year and gives the length and expenditure for 20 years for operation and maintenance, based on the total appropriation for this work but exclusive of sewage-disposal maintenance. This tabulation indicates a reduction in annual expenditure per mile for operation and maintenance in the past 20 years from $126.61 to $68.41.

The gradual reduction in cost indicated has been accompanied by largely increased maintenance work and is due to improvements in efficiency and economy in this important branch of the service.

Year.	Length of sewers.	Expenditure for maintenance.	Cost of maintenance per mile.	Year.	Length of sewers.	Expenditure for maintenance.	Cost of maintenance per mile.
	Miles.				*Miles.*		
1899	394.92	$50,000	$126.61	1909 [1]	542.03	$45,000	$83.02
1900	408.08	50,000	122.52	1910 [1]	567.98	48,500	85.39
1901	421.34	50,000	118.67	1911 [1]	589.74	50,000	84.70
1902	436.89	50,000	132.76	1912 [1]	618.53	50,000	80.84
1903	448.09	58,000	129.44	1913 [1]	644.28	50,000	77.61
1904	456.87	58,000	126.95	1914 [1]	661.49	50,500	76.30
1905	468.86	58,000	123.70	1915 [1]	682.11	50,500	74.03
1906	484.40	42,000	86.70	1916 [1]	702.06	50,000	71.22
1907 [1]	501.44	38,000	75.78	1917 [1]	717.38	50,000	69.69
1908 [1]	521.18	44,500	85.38	1918 [1]	730.84	50.000	68.41

[1] Exclusive of sewage disposal maintenance.

There are now 730.84 miles of main and pipe sewers and 5,842 catchment basins. The work of operation and maintenance includes the inspection, flushing, cleaning, and repairing of all sewers and appurtenances. The record of cost of all work performed, including the comparative costs with preceding years, together with an accurate daily statement of work performed, is maintained on the card system.

The following summary gives a statement of the amount of work in this division for the fiscal year, with details of expenditure for each class of work performed:

Cleaning and repairing, fiscal year 1918.

	Work.	Cost.
CLEANING AND REPAIRING.		
Inspection interior of all main sewers.....miles..	144.97	$428.63
Inspection of pipe sewers.....do....	989.1	
Flushing of pipe sewers.....feet..	5,222.92	3,542.08
Flushing of manholes.....	13,083	
Flushing of storm-water receiving basins.....	17,984	1,336.93
Inspection and cleaning of gates, regulators, and sumps.....	3,733	2,246.77
Cleaning of main sewers.....feet..	595	442.31
Cleaning of pipe sewers.....do....	169,582	3,533.90
Cleaning of basin outlets.....	42	
Cleaning of gravel basins.....	5	238.44
CLEANING OF STORM-WATER RECEIVING BASINS.		
City basins.....	25,837	
Labor.....		3,131.36
Teams.....		8,135.90
Total.....		11,267.26
County basins.....	4,644	
Labor.....		1,170.53
Teams.....		2,347.48
Total.....		3,518.01
Removal by scows:		
Loader.....		1,248.76
Transportation.....		1,090.54
Unloader.....		1,544.85
Total.....		3,884.15
Total cleaning of storm-water receiving basins.....		18,869.42
Cleaning sediment chamber.....		5,188.32
Cleaning of screens.....		1,140.71
Silt removed from main sewers.....cubic feet..	1,745	
Material removed from pipe sewers.....do....	5,450	
Silt removed from gravel basins.....do....	999	
Silt removed from storm-water receiving basins, city.....tons..	4,117	
Silt removed from storm-water receiving basins, county.....cubic yards..	4,646	
Sludge removed from sediment chamber, main pumping station.cubic feet..	55,323	
Material removed from screens at main pumping station.....pounds..	948,118	

Cleaning and repairing, fiscal year 1918—Continued.

	Work.	Cost.
REPAIRS.		
Relaying pipe sewers and basin connections.....feet..	294	$999.57
Abandoning pipe sewers.....do....	1,800	41.83
Special large connections to pipe sewers.....	24	310.00
Repairing main sewers.....	.....	116.13
Inspection and repairs to house connections to main sewers.....	41	85.10
Settlements filled.....	25	163.04
Reconstruction of manholes.....	11	314.69
Adjusting and repairing manholes.....	60	436.46
Abandoning manholes.....	8	31.10
Replacing manhole frames.....	30	503.00
Replacing manhole covers.....	46	
Reconstruction basins.....	1	43.83
Adjusting and repairing basins.....	148	2,189.81
Abandoning basins.....	7	41.98
Replacing alley grates.....	7	239.48
Replacing alley frames.....	7	
Miscellaneous work.....	.....	1,726.75

Division C.—Operation and Maintenance, Sewage-disposal System, Pumping Stations, Shops, and Yards.

Under this division is included the operation and maintenance of the main pumping station, also of substations, gates and regulators; the mechanical equipment of the sewer division, shops, stores, yards, and floating equipment, as well as the installation of mechanical apparatus and special construction.

The main sewerage pumping station was in continuous operation throughout the year, handling the sewage of practically the entire District, as well as all storm water from the 900-acre low area within the dike lines. The various pumping services were operated without any interruption, and the preestablished hydraulic levels, both for sewage and storm water, were maintained without variation both under normal conditions and throughout all storm periods. As an indication of the adequacy in design and construction and in the operation of these works, it should be noted that throughout the period of more than 10 years since they were put in service there has not been a single case of flooding in the 900-acre down town low area within the dike lines or an interruption for a single minute, in that period, of any of the various pumping services.

Main pumping station.—Sewage to the amount of 23,675,000,000 gallons and 978,522,000 gallons of storm water were pumped durng the year, an increase of 1,800,000,000 gallons of sewage over the quantity pumped during the previous fiscal year.

The following is a tabulation of total pumpage by sewage pumps and storm-water pumps for each month of the fiscal year:

Total pumpage in gallons at the main sewerage pumping station.

Month.	Sewage.	Storm water.	Month.	Sewage.	Storm water.
1917.			1918.		
July	2,039,714,000	137,113,000	January	2,063,352,000	131,441,000
August	1,955,554,000	49,030,000	February	1,865,931,000	61,400,000
September	1,782,905,000	51,000,000	March	2,024,576,000	138,061,000
October	1,843,085,000	101,000,000	April	2,124,267,000	123,455,000
November	1,780,029,000	83,241,000	May	2,282,114,000	18,857,000
December	1,787,465,000	32,059,000	June	2,126,008,000	51,865,000

The expenditure of coal and other supplies for the year was as follows: Coal 11,429,853 pounds; cylinder oil, 1,310 gallons; engine oil, 1,292 gallons; miscellaneous oils, 131 gallons; engine grease, 394 pounds; illuminating oil, 2,254 gallons; gasoline, 8,394 gallons. This latter includes all usage of the department during the fiscal year. One thousand eight hundred and five pounds of cotton waste were used and 1,705 pounds washed and reused.

Poplar Point pumping station.—The Poplar Point pumping station, located at the foot of Howard Avenue, has been operated continuously throughout the year, handling all the sewage from the east side of the Anacostia River and discharging same into the main outfall of the sewage disposal system.

A total of 577,800,000 gallons of sewage was pumped during the year, an increase of 125,000,000 gallons over the quantity pumped during the previous fiscal year. The following is a tabulation of the quantities pumped during each month of the fiscal year:

Total pumpage, in gallons, at the Poplar Point pumping station for the year.

Month.	Sewage.	Month.	Sewage.
1917.		1918.	
July	34,042,000	January	46,142,000
August	25,666,000	February	64,230,000
September	31,463,000	March	65,922,000
October	29,792,000	April	127,096,000
November	31,670,000	May	51,607,000
December	27,809,000	June	42,361,000

The expenditure of coal for heating and incinerating purposes was 112,800 pounds; 86,350 pounds of waste matter were removed from the screens and incinerated.

Woodridge substation.—The Woodridge automatic substation, located at Eastern Avenue and Brentwood Road and connecting with the upper east side interceptor of the sewage disposal system, was operated throughout the year, handling all the sewage from the vicinity of Woodridge, D. C.

Sewage to the amount of 6,432,700 gallons was pumped durng the year. The current used was furnished by the Potomac Electric Power Co. at a rate of $0.06 per kilowatt hour. The average cost of pumpage for the year was $1.31 per million foot-gallons.

The following is a tabulation of the quantities pumped during each month of the year:

Total pumpage, in gallons, at the Woodridge substation for the year.

Month.	Sewage.	Month.	Sewage.
1917.		1918.	
July	845,650	January	(1)
August	691,700	February	(1)
September	550,700	March	(1)
October	666,800	April	403,200
November	588,700	May	1,256,950
December	328,000	June	1,101,000

[1] Station temporarily out of service to permit installation of new motor and pump.

The following are the principal items of betterment for the year:

Poplar Point pumping station.—The electric equipment and pumping units were regularly inspected and minor repairs made during the year. Pump No. 3 was thoroughly overhauled and repaired. A screw-type sludge press was built and installed. Minor repairs were made to the electric indicator switchboard.

Woodridge substation.—At the Woodridge substation, the pumping units were dismantled, thoroughly overhauled and repaired. A new 3-inch vertical, submerged, motor-driven, 25-cycle, 3-phase, centrifugal pumping unit equipped with necessary switchboard and automatic stopping and starting switch was installed. This pumping unit was necessary to replace defective unit which was in use.

Repairs were made to the exposed portion of the 4-inch cast-iron force main crossing over the Baltimore & Ohio Railroad.

Main pumping station.—One 2-inch, two-stage centrifugal, auxiliary pressure pump was installed on the hydraulic system; new bronze sleeves were installed at stuffing boxes and lignum-vitæ bearings on engines Nos. 1, 2, and 3, Class 1. A complete new grate equipment was built and installed on boiler No. 4, new grate webs, side bearers, bridge wall angles, throat pieces, and breast plate. Six improved type switches were installed on the electric level indicator. A steam vulcanizer was purchased for the machine shop for repairs to auto tires and tubes. The emergency

breakdown connection between the main station and the United States navy yard was replaced. This work was necessary due to the enlargement and changes now in progress at the navy yard. The fences around the main station and yard were painted.

Repairs and betterments, main pumping station.—Condenser pumping engine No. 3 Class I, was thoroughly overhauled and new piston rods and bucket valve installed. All crosshead guides and pins were refitted on engines Nos. 1, 2, and 3, Class I, also new rollers were made and installed in bearings of governor for generator engine No. 3. The condenser pump for generator No. 2 was overhauled and repaired, new steam piston ring and piston rod was installed; also steam valves were machined and fitted. Renewed steam piston and piston valve, and rebabbitted main and crank bearings on engine of ventilator fan No. 1. Minor repairs and improvements were made to the hydraulic system throughout the year.

In the boiler room, fire-brick arches were renewed in boilers Nos. 2, 3, 4, and 5, and bridge walls in boilers Nos. 2, 4, 5, and 6. The following boiler tubes were renewed: Thirty in boiler No. 5, 15 in boiler No. 2, 4 in boiler No. 6, and 3 in boiler No. 4. The steam and water lines to lock damper regulator were renewed; other renewals were dumping grates, fire guards, and bearing bars for boilers Nos. 4 and 5, dumping grates for boiler No. 6, new top-extension pieces and throat pieces for boilers Nos. 4 and 5 and new angle bars for boiler No. 4. The economizer manifold was re-covered and steam lines installed for heating water for floor cleaner. All sewage screens were thoroughly overhauled, scraped, cleaned, and painted.

Stores.—Supplies, construction materials, and tools purchased during the year were received, inspected, and issued at storerooms and yards. An accurate daily record is kept on the card system and semiannual reports made covering all expendable and unexpendable property. Annually an inventory of all property is taken in order to verify the accounts and close the records for the year. All property, tools, and equipment unfit for further service were delivered to the Auditor's office for condemnation and sale.

Yard.—At the concrete plant 175 side basin tops, 102 corner basin tops, 700 cheek blocks, and 243 drip stones were made during the year. Silt from storm-water catchment basins was weighed and loaded on scows at this yard.

A metal and stucco fireproof paint shop equipped with steam heating system was erected during the year. The electric loader and the wastes removal wharf were repaired. Minor repairs were made to the steam derrick on the materials wharf, to the scale house and roadways of the storage yard. The portable gasoline construction derrick was overhauled, and crank shaft and connecting rod bearings rebabbitted. All materials for use on sewer construction and repair work east of the Anacostia River were stored and issued from the yard at the Poplar Point pumping station.

Ink sludge collected in the settling basins at the Bureau of Engraving and Printing and which was formerly discharged directly into the sewerage system, was removed and disposed of by this division which designed and built these basins. The amount and the cost of disposal of this material is given in the following tabulation. The actual cost of removal and disposal is reimbursed from the appropriation for "Material and miscellaneous expenses, Bureau of Engraving and Printing, 1918."

These settling basins have operated with the most satisfactory results in preventing deposit of this waste in the public sewers. Prior to their construction, large sums were expended in relaying sewers almost completely obstructed by these sludge deposits.

Quantity of ink sludge and cost of removal for the fiscal year.

Date of cleaning.	Tons removed.	Unit cost removal per ton.	Unit cost team haul per ton.	Unit cost transportation and disposal per ton.	Total cost removal transportation per ton.	Total cost removal and disposal.
1917.						
July 27	43.0	$0.29	$0.68	$0.73	$1.71	$80.25
August 24	35.5	.43	.89	.72	2.02	79.19
November 14	39.0	.42	.78	.78	1.98	85.17
November 15	39.8	.41	.77	.78	2.01	88.19
1918.						
February 18	141.0	.43	.75	1.02	2.20	192.92
March 28	49.9	.46	.66	1.57	3.11	79.57
May 5	45.6	.54	.84	2.33	4.52	110.18
June 20	46.9	.67	.78	.30	1.74	95.07
June 28	47.0	.76	.78	.30	1.83	100.02
Total and average	487.7	.49	.77	.95	2.34	910.56

Floating equipment.—The floating equipment was employed throughout the year in conveying materials removed from the sediment chamber, ashes from the pumping station, silt from storm-water catchment basins throughout the city, to their points of disposal; in conveying construction materials along the water front where sewer work was in progress and to the wharf at Poplar Point for storage; in the transportation of chemists in connection with the sanitary survey of the Potomac River and also for the trasnportation of inspectors and assistant engineers. The towboat *Virginia* was thoroughly overhauled, new timing gears for the 50-horsepower Globe engine and cast-iron towing bits installed. Minor repairs were made to the launch. Two flush-deck scows were cleaned and painted and four dredge scows overhauled, cleaned, and planking renewed in sides and bottoms.

Shops.—In addition to the work of this division, enumerated in preceding paragraphs, the work of the shops, in connection with construction and repairs, included all repairs to pumping and other machinery, cleaning and painting wagons, motor trucks, and construction equipment, minor repairs for maintenance and betterment of buildings, and the maintenance of electric lighting and power circuits. Twenty-four basin-cleaning wagons, 27 wagons, 6 carts, 6 hose reels were overhauled and repaired; also 24 basin-cleaning wagons, 27 wagons, 6 carts, 3 hose reels, and 2 buggies were overhauled, repaired, and painted. Two autos were thoroughly overhauled and repaired and 1 auto painted. Small tools were made as follows: Twenty-three chisels, 2 dippers, 2 crowbars, 3 drills, 8 cutters, 6 signs, and 57 miscellaneous tools. Small tools were repaired as follows: One hundred and twenty-seven chisels, 95 drills, 229 points, 1,945 picks, 42 cutters, 1 axe, 11 wrenches, 6 manhole lifters, 37 wheelbarrows, 18 mattocks, 9 basin scoops, 30 wedges, 7 boat pumps, 29 oil cans, 16 crowbars, and 50 miscellaneous tools. Twelve hundred and seventy-six manhole irons were made for construction work. Forms were made for 14 construction and repair jobs.

Miscellaneous construction.—Tide gates were built and hung at the outlets of the Easby Point and Klingle Valley trunk sewers, and also for the special tide gate chambers located at Twenty-first and B Streets NW., Fourth and N Streets SE., and Canal and N Streets SE. Forms were built for the new paint shop.

Miscellaneous work.—Repairs were made to the various sewer department wharves and flooring renewed at the steam-derrick wharf. The parking and roadways were repaired and improved around the main station and at Poplar Point.

Two frame houses for use on sewer construction in tunnel were built and each equipped with a 2-ton electric hoist having a lift of 45 feet and attached controller with pendant rope operation.

Bodies and tops were built for the two new motor trucks purchased during the year.

Division D.—Construction, Sewerage System.

The following is a statement of the length of sewers constructed during the year and the cost of same aggregated for the several construction districts:

Section.	Length.	Cost.
	Feet.	
1. County west of Rock Creek	15,268.90	$114,750.93
2. County east of Rock Creek	23,072.80	110,078.71
3. County west of Anacostia River	4,892.10	11,218.03
4. County east of Anacostia River	22,856.77	74,999.32
5. Washington City	7,650.65	68,159.25

The following is a detailed statement of sewers constructed in the various districts:

Western district, county west of Rock Creek.—In this area 3,354.70 linear feet of trunk sewers, 5,010.60 linear feet of service mains, and 6,903.60 linear feet of service sewers, a total of 15,268.90 linear feet, were constructed as follows: Tenleytown, 2,960 linear feet of service mains; Chevy Chase, 1,934 linear feet of service mains and 3,315.40 linear feet of service sewers, a total of 5,249.40 linear feet; Cleveland Park, 24 linear feet of service mains and 1,149.10 linear feet of service sewers, a total of 1,173.10 linear feet; Woodley, 2,280.20 linear feet of trunk sewers and 1,139.30 linear feet of service sewers, a total of 3,419.50 linear feet; Arizona, 1,074.50 linear feet of trunk sewers, 92.60 linear feet of service mains, and 511.30 linear feet of service sewers, a total of 2,466.90 linear feet; Georgetown, 788.50 linear feet of service sewers.

Ten storm-water receiving basins were constructed in this district during the year.

The following special work was done during the year: Contracts were let and work completed on the Pinehurst service sewers; in Massachusetts Avenue from Yuma

Street to Nebraska Avenue sanitary sewer was constructed for the Engineer camp at American University. Work was continued on the construction in tunnel of Dalecarlia main intercepting sewer which extends through the grounds of the Dalecarlia Reservation.

Contracts were let for the construction of the Klingle Road and the Reno Road trunk sewers, and storm-water outlet, façade walls in connection with the park stream discharge at Klingle Bridge were constructed on the Klingle Road trunk sewer at Rock Creek.

Central district, county east of Rock Creek.—In this area 7,867. 70 linear feet of trunk sewers, 2,248.30 linear feet of service mains, and 12,956.80 linear feet of service sewers were constructed as follows: Takoma, 4,825.50 linear feet of service sewers; Brightwood, 3,507.20 linear feet of trunk sewers, 1,300.30 linear feet of service mains, and 200 linear feet of service sewers, a total of 5,007.50 linear feet; Petworth, 1,892 linear feet of trunk sewers, 948 linear feet of service mains, and 4,864.50 linear feet of service sewers, a total of 7,704.50 linear feet; Mount Pleasant, 2,468.50 linear feet of trunk sewers, and 576.10 linear feet of service sewers, a total of 3,044.60 linear feet; Washington Heights, 2,490.70 linear feet of service sewers. Fifty storm-water receiving basins were constructed in this district during the year.

The following special work was done during the year: A junction chamber and connection was built over the Mount Pleasant relief sewer at Park Road and Holmead Place.

Contracts were completed for the construction of the Mount Pleasant relief sewer, Georgia Avenue trunk sewer between Jefferson and Madison Streets, and the Delafield Place trunk sewer; also contract was completed for the construction of service sewers in Crittenden between Fourteenth and Fifteenth Streets, Taylor between Seventeenth and Eighteenth Streets, and in Eighteenth between Taylor and Upshur Streets.

Eastern district, county west of Anacostia River.—In this area, between North Capitol Street and the Anacostia River, 785.50 linear feet of service mains and 8,922.60 linear feet of service sewers, a total of 9,708.10 linear feet, were constructed as follows: Brookland, 1,125.10 linear feet of service sewers; Brightwood, 145 linear feet of service sewers; Eckington, 123.30 linear feet of service sewers; Langdon, 2,317 linear feet of service sewers. Five storm-water receiving basins were constructed in this section during the year.

Contract was let during the year for the construction of the East Brookland trunk sewer, in this district, extending from Eighteenth and Newton Streets NE. to Fifteenth and Hamlin Streets.

Eastern district, county east of Anacostia River.—In this area, east of the Anacostia River, 3,433.60 linear feet of trunk sewers, 288 linear feet of service mains, and 19,135.17 linear feet of service sewers, a total of 22,856.77 linear feet, were constructed as follows: Anacostia, 288 linear feet of service mains and 1,529 linear feet of service sewers, a total of 1,817 linear feet; Congress Heights, 2,254.28 linear feet of trunk sewers, 3,773.30 linear feet of service sewers, a total of 6,027.58 linear feet; Bennings, 1,179.32 linear feet of trunk sewers, and 21.30 linear feet of service sewers, a total of 1,200.62 linear feet; Kenilworth, 13,682.37 linear feet of service sewers.

The following special work was done during the year: Trunk sewer outlet at Scaggs Branch between the established bulkhead line of the Anacostia River improvement, east side of the Anacostia River and the shore line, was completed during the year. This work was necessary in advance of the filling of the Anacostia River flats by the United States Engineer office. The construction of trunk sewers and service mains in Portland Street between First Street and Nichols Avenue was completed during the year. This work was necessary in advance of the grading and improving of this street.

Contracts were let and work begun on the construction of the Burnt Bridge Run trunk sewer between the Baltimore & Ohio Railroad and Minnesota Avenue and for the Stickfoot Branch trunk sewer between the Baltimore & Ohio Railroad and Nichols Avenue.

Contract was let for the construction of the East Brookland trunk sewer, extending from Eighteenth and Newton Streets to Fifteenth and Lawrence Streets NE.

Contracts were let and work completed for the following service sewers: Kenilworth Avenue between Quarles Street and Eastern Avenue, Grant Street between Forty-fourth Street and Division Avenue, Forty-ninth Street between Eads Place and Grant Street and in both sides of Rhode Island Avenue between Brentwood Road and Twenty-sixth Street.

Eighteen storm-water receiving basins were constructed in this district during the year.

Washington City district.—In this area 1,482.35 linear feet of trunk sewers and 6,168.30 linear feet of service sewers, a total of 7,650.65 linear feet were constructed, as follows: Northwest section, 427 linear feet of trunk sewers and 4,066.80 linear feet of service sewers, a total of 4,493.80 linear feet; northeast section, 94.50 linear feet of service sewers; southeast section, 589.25 linear feet of trunk sewers and 279 linear feet of service sewers, a total of 868.25 linear feet; southwest section, 466.10 linear feet of trunk sewers and 279 linear feet of service sewers, a total of 745.10 linear feet. One hundred and thirteen storm-water receiving basins were constructed in this section during the year, and 15 storm-water receiving basins were reconstructed.

The following special work was done during the year: Eight hundred and ten linear feet of new concrete invert was constructed in the old Tiber Creek trunk sewer.

Contracts were let and work completed for the extension of the Easby Point high-level interceptor and the Fourth Street SE. trunk sewer, to the newly established bulkhead lines.

Special tide-gate chambers were built at Twenty-first and B Streets NW., and at Fourth and N Streets SE., also a special regulator chamber was built at Canal and N Streets SE., in connection with the James Creek Valley trunk sewer now under contract.

The following tabulation shows the construction of the sewerage system, the average cost per mile, the funds appropriated for sewer construction, and the approximate population for each year for 20 years:

Year.	Population.	Appropriation for construction.[1]	Miles constructed.	Average cost per mile.
1899	274,000	$158,629.30	10.18	$15,582.44
1900	279,000	175,000.00	12.49	14,011.21
1901	284,000	250,000.00	13.25	18,867.92
1902	289,000	230,000.00	12.87	17,871.02
1903	294,000	170,000.00	16.42	10,353.23
1904	300,000	172,000.00	8.78	19,589.98
1905	305,000	168,650.00	11.99	14,065.89
1906	310,000	170,000.00	15.54	10,939.51
1907	315,000	333,000.00	17.09	19,485.08
1908	321,000	281,800.00	19.74	14,275.58
1909	326,000	259,500.00	18.01	14,408.66
1910	331,000	224,975.00	25.51	8,815.17
1911	341,000	219,040.00	23.18	9,449.53
1912	352,000	320,000.00	24.68	12,965.96
1913	353,000	320,000.00	23.52	13,605.44
1914	356,000	345,000.00	17.21	20,046.48
1915	359,000	382,500.00	20.54	18,622.20
1916	360,000	360,800.00	19.28	18,713.74
1917	362,000	425,000.00	14.89	28,542.71
1918	396,000	432,000.00	13.47	32,071.27

[1] Excluding sewage disposal system.

SEWAGE-DISPOSAL SYSTEM.

Rock Creek main interceptor sewer.—The contract for the construction of section 8 of this interceptor was completed during the fiscal year by the construction of 3,507.2 linear feet of 3 feet 6 inches by 5 feet brick and concrete sewer.

This construction completes the Rock Creek main interceptor as far northward as Military Road, at which point it receives the existing sanitary sewers from the Pinehurst subdivision, Luzon Valley sewer, which drains the Walter Reid Hospital grounds and the territory lying just east of Takoma Park.

Anacostia main interceptor sewer.—The construction of section 6 of this interceptor, extending along the east shore of the Anacostia River and northward from the Benning yard of the Philadelphia, Baltimore & Washington Railroad for a distance of 2,100 linear feet, was completed during the year. Work was begun on the construction of sections 7, 8, 9, and 10 of this interceptor. This work will complete the construction of this interceptor from Poplar Point to Bennings, where it is proposed to construct the Bennings pumping station.

Upper Potomac interceptor sewer.—Contracts were let for the construction of sections 1, 2, and 3 of this interceptor, extending along the Georgetown water front from Twenty-seventh Street to Thirty-fourth Street. Contracts were also let for furnishing pumps, motors, and sluice gates to be used in the Rock Creek pumping station.

Length of main sewers and pipe sewers and the number of storm-water receiving basins constructed during the fiscal year ending June 30, 1918.

Appropriations.	Main sewers.	Pipe sewers.	Storm-water receiving basins.
	Linear feet.	*Linear feet.*	
Main and pipe sewers	1,482.35	2,826.50	50
Suburban sewers	7,444.52	15,710.37	66
Assessment and permit		40,509.90	
Sewage-disposal system	4,862.00		
Miscellaneous trust-fund deposits	1,869.00	1,297.00	64
Miscellaneous appropriations			11
Total	15,657.87	60,343.77	191

RECAPITULATION.

Total length of sewers on June 30, 1918:		
Main sewers	miles	144.97
Pipe sewers	do	585.87
Total		730.84
Cost of sewage system, June 30, 1918		$13,949,036.45
Cost of sewage disposal system, June 30, 1918		4,720,324.92
Total		18,669,361.37

DIVISION E—MAPS, RECORDS, AND DRAFTING.

Work was continued during the year in preparing the detail set of maps, showing all underground construction, including conduits, gas and water mains, sewers, vaults, building projections, as well as building restriction lines, curb and street-railway tracks.

Detailed drainage studies have been prepared for 161 engineer department files and 117 plats prepared for extension of main and pipe sewers and receiving basins. Nine files from the health office have required field work to determine the availability of various public sewers for house connections; also 28 files have been forwarded, showing assessment on account of connections from parcel property to public sewers for which 28 plats were prepared; 198 engineer department files of miscellaneous nature were acted on, making a total of 396 engineer department files forwarded for action during the entire year.

Four record maps of sewers have been made during the year. The work of posting current construction on these maps has progressed up to date as well as new streets and alleys and much missing data of old work secured from field surveys.

The counter tracings for use of the public for information have been kept posted to date with current construction as well as newly established or modified street grades. Six new sheets covering additional territory have been added during the year.

The 100-foot scale drainage study maps for the suburban portions of the District have been kept posted to date with current construction as well as with newly established or modified street grades and new subdivisions. In addition, 14 old and badly worn maps have been replaced by new ones.

One hundred and fifty-seven cards showing assessment to be pending for future sewers have been made, and 84 engineer department files, inclosing plats showing the construction of service sewers abutting assessable property have been forwarded through the chief clerk, engineer department, to the assessor.

Twenty-four letters have been forwarded to the health officer with plats as notice of newly constructed service sewers where same abutted existing houses; 126 existing houses were reported as abutting service sewers constructed during the year.

The card-index record of all newly made subdivisions has been kept posted to date, 161 of same having been recorded. In addition to this index record, these subdivisions are also posted on all maps, record made, and notice prepared for the assessor upon subdivision of parcel property where same abuts service sewer in order that the proper special assessment may be levied.

One hundred and fifty new grade sheets for work constructed during the year have been made and recorded and four old and badly worn sheets have been replaced by new ones.

In order to keep in touch with the development of the water distribution system, and to secure a harmonious development with the sewerage system throughout the suburban districts, a general map showing all proposed water mains is kept posted as such work is ordered.

All paving schedules of the surface division, 40 in number, and covering 312 paving jobs, have been given careful consideration, and where necessary, studies prepared for construction, reconstruction or abandoning of sewers in advance of paving.

Thirty-eight surface division grade maps for the establishment of new street grades or modification of established grades have been studied with reference to the effect on the drainage system and where necessary modifications have been recommended before approval of same.

Plans, estimates, proposals, and specifications have been prepared for the construction of sewers under nine contracts.

Six plats and deeds for rights of way have been prepared in connection with the extension of the public sewerage system, and all of same have been acquired and recorded. These are listed in Table 15, appended to this report.

Work has been continued in the process of elimination of privies and a card index kept posted of every privy maintained in the District. One hundred and eighty-eight studies were made with a view of extending the sewerage system in order that this number of privies might be eliminated. Six notices were forwarded to the health officer of dwellings maintaining privies where public sewers were available for conection. New sewers abutting 126 dwellings using privies were laid and the health officer so notified. Permits were issued by the health officer for the erection of 58 new privies.

Division F.—Records and Accounts.

The work of this division consists in the preparation of requisitions and vouchers, records of costs of construction, cost keeping, preparing pay rolls, and material and equipment accounting. It included for the year 775 construction jobs, 11,565 foremen's reports, 44,496 card records, 916 supply bills, 638 pay rolls, 850 requisitions, 240 transfer and refund vouchers, 102 tool and supply orders, 431 engineer department files, 84 letters, and 32,092 miscellaneous reports. The following abstract financial statement for the various sewer appropriations and other sewer funds gives a résumé of the expenditures. The total expenditure on account of sewers for the year amounted to $633,574.13.

SEWERAGE SYSTEM.

Cleaning and repairing sewers and basins:		
Appropriation		$68,000.00
Expended—		
Mechanics, laborers, and watchmen	$42,456.83	
Drivers and gate tenders	10,965.95	
Inspectors and other per diem employees	1,697.26	
Construction material and tools	1,508.21	
Repairs to equipment, equipment and supplies	5,655.71	
Paid surface division for repaving work	272.39	
Paid engineer department stables for forage, blacksmith work, etc	5,115.61	
Paid purchasing office for salaries	240.17	
		67,912.13
Unexpended balance		87.87
Maintenance and operation, sewage pumping service:		
Appropriation		62,096.00
Expended—		
Mechanics, laborers, and watchmen	20,696.03	
Coal, oil, waste, and other supplies	38,819.15	
Tools and equipment renewals	2,563.13	
		62,078.31
Unexpended balance		17.69

Main and pipe sewers and receiving basins:		
Appropriation		$107,000.00
Expended—		
Contract construction	18,155.01	
Day-labor construction	28,105.29	
Construction material and tools	16,264.96	
Inspectors and other per diem employees	6,363.45	
Paid surface division for repaving work	1,935.86	
Paid purchasing office for salaries, etc	682.62	
Paid chief clerk's office for salaries	87.75	
Paid corporation counsel's office for salaries	112.92	
Outstanding contracts and material to complete same	35,000.00	
		106,707.86
Unexpended balance		292.14
Suburban sewers:		
Appropriation		200,000.00
Expended—		
Contract construction	41,636.26	
Day-labor construction	29,454.15	
Construction material and tools	16,780.36	
Inspectors and other per diem employees	11,278.99	
Paid surface division for repaving work	1,845.66	
Paid purchasing office for salaries, etc	1,319.27	
Paid chief clerk's office for salaries	320.75	
Paid corporation counsel's office for salaries	112.92	
Outstanding contracts and material to complete same	97,000.00	
		199,748.36
Unexpended balance		251.64
Assessment and permit work, sewers:		
Appropriation		125,000.00
Expended—		
Contract construction	32,311.53	
Day-labor construction	46,901.34	
Construction material and tools	22,758.66	
Inspectors and other per diem employees	7,839.88	
Paid surface division for repaving work	1,375.57	
Paid engineer department stables for forage, blacksmith work, etc	108.40	
Paid purchasing office for salaries, etc	1,329.47	
Paid chief clerk's office for salaries	224.25	
Paid disbursing office for salaries	100.00	
Paid corporation counsel's office for salaries	112.92	
Outstanding contracts and material to complete same	11,000.00	
		124,062.02
Unexpended balance		937.98
Miscellaneous trust-fund deposits, District of Columbia:		
Amount received from various depositors, fiscal year 1918		37,084.19
Expended—		
Contract construction	3,500.00	
Day-labor construction	17,938.74	
Construction material and tools	8,768.96	
Paid surface division for repaving work	685.86	
Contingent charges for engineering, supervision, wear of tools, etc	2,589.64	
		33,483.20

Miscellaneous trust-fund deposits, District of Columbia—Continued.		
Inspection and engineering, cleaning and repairing—		
Cleaning garage traps	$413.76	
Inspection of vaults	14.00	
Inspection of private pipe lines	9.00	
Engineering and inspection of steam pipe lines	28.73	
		$465.49
Returned to depositors		935.50
Carried over to 1919		2,200.00
Total		37,084.19
Sewer construction from miscellaneous appropriations:		
Repayments		31,954.13
Expended—		
Sewer construction—		
Contract construction	$14,404.85	
Day-labor construction	6,510.40	
Construction material	4,467.42	
Paid surface division for repaving work	17.81	
Contingent charges for supervision, engineering, wear of tools, etc	1,224.64	
		26,625.12
Inspection, cleaning, repairing, and other work—		
Inspection and repairs to trunk-sewer connections from houses	76.00	
Inspection and repairs to sewer connections from fire hydrants	28.00	
Special large-size connections to sewers	310.00	
Adjusting basins and manholes in connection with surface division work	348.15	
Cleaning Bureau of Engraving and Printing ink basins	848.53	
Erection and removal of rope barricades from Peace Monument to Eighteenth Street NW., in connection with maintenance of public order (drafted men and Liberty loan parades)	835.68	
Removal of snow from city streets	1,314.43	
Hauling coal (emergency relief coal famine)	975.51	
Dredging channel at Blue Plains, D. C	256.10	
Pumping storm water from flooded buildings, various locations	272.61	
Hire of barge to Navy Department, Bureau of Yards and Docks	64.00	
		5,329.01
Total		31,954.13
Purchase and condemnation of land for rights of way for sewers:		
Appropriation		2,000.00
Expended; cost of rights of way, titles, and recorder fees		377.24
Unexpended balance		1,622.76

Summary of expenditures, sewerage system.

Cleaning and repairing, 1918	$67,912.13
Maintenance and operation, 1918	62,078.31
Main and pipe sewers, 1917	2,317.02
Main and pipe sewers, 1918	71,707.36
Suburban sewers, 1916	24,369.79
Suburban sewers, 1917	56,079.42
Suburban sewers, 1918	102,748.36
Assessment and permit work, 1916	2,575.60
Assessment and permit work, 1917	21,658.97
Assessment and permit work, 1918	113,062.02
Permit work, 1918	226.75

Miscellaneous trust-fund deposits, 1918	$33,948.69
Miscellaneous appropriations, 1918	31,954.13
Condemnation, 1918	377.24
Outstanding contracts:	
Main and pipe, 1918	35,000.00
Suburban sewers, 1917	55,840.00
Suburban sewers, 1918	97,000.00
Assessment and permit work, 1916	1,388.00
Assessment and permit work, 1918	11,000.00
	791,243.79

The following are payments into the Treasury on account of assessment for service sewers under the appropriations indicated below during the fiscal year 1918:

Suburban sewers	$20.11
Assessment and permit work sewers	40,982.87
	41,002.98

SEWAGE-DISPOSAL SYSTEM.

Upper Potomac interceptor:		
Appropriation		$85,000.00
Expended—		
Day-labor construction	$397.73	
Construction material	211.20	
Equipment	7,025.00	
Outstanding contracts and material to complete same	77,300.00	
		84,933.93
Unexpended balance		66.07

Summary of expenditures, sewage disposal system.

Anacostia main interceptor, 1916	13,835.43
Anacostia main interceptor, 1917	370.39
Rock Creek main interceptor, 1917	20,713.37
Upper Potomac interceptor, 1917	5.22
Upper Potomac interceptor, 1918	7,633.93
Outstanding contracts:	
Anacostia main interceptor, 1916	12,200.00
Anacostia main interceptor, 1917	39,100.00
Upper Potomac interceptor, 1917	29,900.00
Upper Potomac interceptor, 1918	77,300.00
	201,058.34

TOTAL EXPENDITURES.

Sewerage system	$590,638.55
Sewage-disposal system	42,558.34
Purchase and condemnation of land for rights of way	377.24
Total expenditures during fiscal year 1918	633,574.13

ALLOTMENTS.

Statement of expenditures under allotments made to other departments from sewer appropriations, fiscal year 1918.

Appropriations.	Engineer stables.	Purchasing officer.		Chief clerk, engineer department.	Disbursing office.	Corporation counsel's office.	Total.
		Salaries.	Sand wharf.				
Total allotments	$8,314.43	$2,699.11	$872.42	$632.75	$100.00	$338.76	$12,957.47
Expended:							
Cleaning and repairing	8,206.03	240.17	.....	.....	.....	.....	8,446.20
Main and pipe	.....	480.34	202.28	87.75	.....	112.92	883.29
Suburban sewers	.....	1,319.27	.....	320.75	.....	112.92	1,752.94
Assessment and permit work	108.40	659.33	670.14	224.25	100.00	112.92	1,875.04
Total expenditures	8,314.43	2,699.11	872.42	632.75	100.00	338.76	12,957.47

Statement of expenditures under allotments from outside departments to sewer department during the fiscal year 1918.

Contingent expenses:	
Total allotment	$1,200.00
Expenditures, stationery, printing, and supplies	1,196.18
Unexpended balance	3.82

Statement of expenditures for per diem employees, fiscal year 1918.

Cleaning and repairing	$1,262.38
Main and pipe	3,070.50
Suburban sewers	8,562.39
Assessment and permit work	5,931.33
Anacostia main interceptor	408.50
Rock Creek main interceptor	889.75
Total	20,124.85

The following is a statement of the unexpended balances of the three principal construction appropriations for 1901 to 1917, inclusive:

Fiscal year.	Main and pipe sewers.	Suburban sewers.	Assessment and permit.	Total.
1901	$1,656.53	$2,237.61		$3,894.14
1902	2,610.75	6,745.80		9,356.55
1903	3,948.39	5,762.88		9,711.27
1904	268.70	2,072.54		2,341.24
1905	5,676.05	6,926.46		12,602.51
1906	7,177.09	4,798.30		11,975.39
1907	255.68	11,038.27		11,293.95
1908	3,878.93	815.05		4,693.98
1909	678.12	570.80		1,248.92
1910	622.34	4,486.94		5,109.28
1911	489.36	401.36		890.72
1912	3,716.32	791.12		4,507.44
1913	119.82	13.36	$118.16	251.34
1914	83.43	1,316.55	134.65	1,534.63
1915	37.00	441.18	3,785.50	4,263.68
1916	17.65	20.00	3,673.75	3,711.40
1917	127.73	302.42	1.38	431.53
Total	31,363.89	48,740.64	7,713.44	87,817.97

Statement of expenditures for supervision, inspection, and record on account of underground construction, public-service corporations, and the amounts charged to each of the several corporations for the fiscal year 1918.

Expenditures:	
Supervision	$1,092.21
Inspection	1,496.54
Record	524.07
Total	3,112.82
Charged as follows:	
Potomac Electric Power Co	$1,061.74
Chesapeake & Potomac Telephone Co	1,217.08
Washington Gas Light Co	659.86
Georgetown Gas Light Co	104.28
Washington Railway & Electric Co	4.00
Capital Traction Co	65.86
Total	3,112.82

Division G.—Public-Service Corporation Construction.

This special work assigned to the division of sanitary engineering involves detailed determination of locations for new extensions of gas mains, electric, telephone, and telegraph conduits and their accessories as well as methodic supervision of the work done under permits therefor and the accurate location of all work. Applications for these new constructions require careful location studies to avoid interference with existing and future construction, and particularly to assure economical and orderly occupation of the public space along predetermined systematic lines. During construction the work is regularly inspected, compliance with the terms of the permit are insisted upon, and an accurate record of the location of all work is obtained from field measurements. Record sheets are prepared showing the work in detail, and the work is then plotted on record maps and recorded on card system.

The work for the year may be summarized as follows:

Permits prepared upon application		1,256
New record cards made		1,256
New jobs inspected and recorded on sheet		1,183
Inspections of work under construction		3,085
Daily average jobs under construction		34
New gas mains laid	miles	6.81
Electric duct laid	do	94.81
Manholes constructed		795
Drains from manholes and railway tracks		113
Houses connected with gas mains		802
Houses connected for electric light and power		760

UNITED STATES GOVERNMENT WORK.

A 12-inch steam main and 4-inch return pipe 618 feet long was laid from the Navy Department to the new building on the south side of New York Avenue NW., known as Corcoran Court, for the United States Government. Work was started on a conduit for steam pipes from the old Potomac Electric Power Co. power house at Fourteenth and B Streets to the new Army and Navy Buildings west of Seventeenth Street and upon the construction of a conduit in Fourteenth Street SW., south of B Street.

PRIVATE PIPE LINES.

Permits prepared for gasoline and compressed-air pipes	9
Inspected, located, and plotted	9

PRIVATE VAULTS IN PUBLIC SPACE.

Applications approved	13
Vaults inspected, located, and recorded	5

WATER-DEPARTMENT CONNECTIONS TO THE SEWERAGE SYSTEM.

There were 60 permits issued the water department for drains from fire hydrants, blow-offs, air valves, and watering troughs, and 39 were inspected and recorded. Certification of noninterference with existing underground construction of record was made in connection with 22 conduits constructed by the electrical department, and 10 letters were written the public-service corporations at request of the surface division. In addition to the current work of the year, much data was collected as to the location of previously unrecorded vaults, mains, and conduits, but a large amount still remains to be done.

Recapitulation of the Sewerage System and Sewage-Disposal System.

Constructed during fiscal year 1918:		
Main sewers	miles	2.04
Pipe sewers	do	11.43
Total	do	13.47
Mileage in service June 30, 1918:		
Main sewers	miles	144.97
Pipe sewers	do	585.87
Total	do	730.84

Expended for construction during fiscal year 1918:	
Sewerage system	$379,206.24
Sewage-disposal system	35,159.21
Total expenditure for construction to June 30, 1918:	
Sewerage system	13,949,036.45
Sewage-disposal system	4,720,324.92
Total	18,669,361.37

Very respectfully, your obedient servant,

ASA E. PHILLIPS,
Sanitary Engineer, District of Columbia.

The ASSISTANT TO THE ENGINEER COMMISSIONER.

TABLES.

TABLE 1.—*Sewerage system contract construction, fiscal year 1918.*

Contract No.	Constructed. Length.	Constructed. Size.	Total cost.	Appropriations.	Contractor.
	Feet.				
5998	4.52	3 by 6-foot	$24,369.79	Suburban, 1916	W. D. Murray Co.
	101.40	4 by 4-foot			
	496.00	4-foot 6-inch by 4-foot 6-inch			
	16.00	4-foot 6-inch by 5-foot			
	15.90	6 by 5-foot			
	330.00	9-foot			
	215.50	10 by 7-foot			
6053	301.10	18-inch	2,575.60	Assessment and permit, 1916	George Hyman.
	484.40	15-inch			
	156.50	12-inch			
6161	230.00	9 by 7-foot	8,399.52	Main and pipe, 1917	W. F. Brenizer Co.
6180	74.10	4 by 4-foot	2,986.34	Assessment and permit, 1917	Do.
	1,100.18	4-foot	[1] 14,055.28	Suburban, 1917	
	1,080.00	3-foot			
	2,340.80	24-inch			
	832.50	21-inch			
	1,879.00	6-inch			

[1] $6,983.51 repaid from suburban roads and suburban streets, District of Columbia, 1917.

TABLE 1.—*Sewerage system contract construction, fiscal year 1918*—Continued.

Contract No.	Constructed. Length.	Constructed. Size.	Total cost.	Appropriations.	Contractor.
	Feet.				
6199	.....	.....	(1)	Suburban, 1917	W. F. Brenizer Co.
6202	512.00	3-foot 6-inch by 5-foot.	$11,245.29	....do	L. M. Johnston.
	377.00	3-foot 6-inch.			
	488.00	3-foot.			
6241	2,630.60	21-inch.	3,461.05	Assessment and permit, 1917	Louis Aiello.
	574.50	12-inch.			
	668.90	10-inch.			
6260	2,993.10	12-inch.	6,265.07	....do	Do.
	215.15	18-inch.			
	960.00	10-inch.			
6265	.....	.....	[1] 8,961.80	Suburban, 1917	W. F. Brenizer Co.
6266	.....	.....	(2)	....do	Do.
6267	4,456.65	12-inch.	4,741.93	Assessment and permit, 1917	Do.
	400.00	10-inch.			
6269	1,174.00	2-foot 6-inch by 3-foot.	4,835.44	Suburban, 1917	W. H. H. Allen Co.
6281	.....	.....	(2)	Upper Potomac interceptor 1917.	W. F. Brenizer Co.
6282	(3)	.....	[4] 1,313.97	Main and pipe, 1917	Do.
6291	.....	.....	36,889.42	Suburban, 1917	W. H. H. Allen Co.
			[1] 11,077.48	Suburban, 1918	
6294A	479.50	18-inch.	2,130.72	Assessment and permit, 1917	Wm. F. Cush.
6294B	903.20	12-inch.	2,702.62	....do	Do.
6294C	679.00	18-inch.	3,504.86	....do	Do.
	220.00	12-inch.			
6294D	749.70	10-inch.	1,900.83	....do	Do.
6294E	408.00	18-inch.	4,471.82	....do	Do.
	761.50	15-inch.			
6294F	701.30	12-inch.	2,907.12	....do	Do.
6294G	.....	.....	(2)	....do	Do.
6296	.....	.....	[1] 11,791.24	Suburban, 1918	W. F. Brenizer Co.
6297	1,892.00	2-foot 6-inch by 3-foot 6-inch.	[5] 11,693.41	....do	Do.
6310	.....	.....	(2)	Main and pipe, 1918	L. M. Johnston.
6313	1,613.72	15-inch.	6,132.24	Assessment and permit, 1918	W. F. Brenizer Co.
	568.20	12-inch.			
6332	589.15	4-foot 6-inch.	15,796.75	Main and pipe, 1918	Do.
6387	565.00	3-foot 6-inch.	6,810.62	Suburban, 1918	L. M. Johnston.
6448	2,960.00	15-inch.	9,959.18	Assessment and permit, 1918	Louis Aiello.
6461	1,408.00	10-inch.	4,201.31	....do	George Hyman.
6478	1,309.00	12-inch.	3,977.62	....do	Wm. F. Cush.
6509	.....	.....	(2)	Suburban, 1918	George Hyman.
6510	.....	.....	(2)	....do	Do.
6514	.....	.....	(2)	....do	Louis Aiello.
6516	.....	.....	(2)	Main and pipe, 1918	W. F. Brenizer Co.
6517	.....	.....	(2)	Upper Potomac interceptor, 1918.	Do.
6518	.....	.....	(2)	....do	Do.
	40,915.07		229,158.32		

[1] Continued in 1919.
[2] Work not started.
[3] 12 catch basins.
[4] Paid from appropriation for suburban roads and suburban streets, District of Columbia, 1917.
[5] $3,500 paid from deposit of M. M. Parker.

TABLE 2.—*Sewage-disposal system contract construction, fiscal year 1918.*

Contract No.	Section.	Total cost.	Appropriation.	Contractor.
6027	Anacostia main interceptor, section 6.	[1] $13,835.43	Anacostia main interceptor, 1916.	W. F. Brenizer Co.
6204	Rock Creek main interceptor, section 8.	15,482.97	Rock Creek main interceptor, 1917.	George Hyman.
6206	Anacostia main interceptor, sections 7, 8, 9, 10.	(2)	Anacostia main interceptor, 1917.	W. F. Brenizer Co.
	Total	29,318.40		

[1] Work not completed. [2] Work not started.

TABLE 3.—*Sewer construction under permit system from the appropriation for assessment and permit work for the fiscal year 1918.*

Order No.	Location.	Length.	Size.	Amount of deposit.	Cost.		Total cost.	Amount returned.	For whom done.
					To District of Columbia.	To depositor.			
		Ft.	*In.*						
1	30th St. NE., between Evarts and Franklin Sts.	235.2	10	$200.00	$200.00	$200.00	$400.00	.....	Walter S. Phelps.
2	E. side 13th St. NW., between G and H Sts.	8.0	12	30.00	26.75	26.75	53.50	$3.25	National Savings & Trust Co.
	Total.....	243.2	22	230.00	226.75	226.75	453.50	3.25	

TABLE 4.—*Sewer construction under the assessment system from the appropriation for assessment and permit work for the fiscal year 1918.*

Order No.	Length.	Size.	Total cost.	Order No.	Length.	Size.	Total cost.
	Feet.	*Inch.*			*Feet.*	*Inch.*	
100	341.0	10	$761.35	149	141.0	12	$457.96
101	236.3	12	500.52	150	385.44	10	751.38
102	283.0	10	533.89	151	214.56	10	408.16
103	288.8	10	619.27	152	35.0	12	65.11
104	548.9	10	839.64	153	271.0	12	577.22
105	105.0	12	358.78	154	35.0	12	132.89
106	142.0	12	414.68	155	360.8	24	1,874.37
107	145.0	10	302.92	156	156.0	12	843.80
108	104.3	12	571.14	157	426.44	12	1,336.88
109	657.3	12	1,315.56	158	138.66	12	287.64
110	612.2	10	1,051.05	159	349.4	12	965.46
111	336.3	15	903.03	160	530.0	21	2,054.82
112	243.0	10	425.59	161	(1)	.....	.....
113	379.9	10	626.86	162	245.80	12	851.08
114	291.8	10	394.23	163	275.0	[2] 10	506.38
115	334.8	10	633.72	164	255.0	8	440.41
116	(1)	.....	.....	165	280.5	12	891.96
117	77.0	12	210.75	166	332.5	12	1,374.75
118	160.0	10	267.72	167	62.1	10	197.96
119	72.0	12	167.01	168	95.2	12	338.98
120	74.7	12	199.47	169	273.5	[2] 12	764.77
121	206.50	12	558.55	170	250.0	[2] 12	630.20
122	269.6	10	533.53	171	363.7	10	596.14
123	185.50	24	1,070.39	172	256.0	12	713.97
124	57.7	18	310.52	173	111.8	12	546.37
125	100.0	15	282.79	174	214.5	10	387.70
126	200.0	12	466.54	175	83.0	12	246.32
127	107.6	12	500.62	176	242.0	12	769.18
	23.3	10		177	189.0	12	491.46
128	352.64	10	698.54	178	233.3	[2] 12	812.96
129	710.17	10	872.91	179	331.5	12	974.71
130	378.0	12	680.93	180	259.5	[2] 12	639.72
131	151.5	10	498.49	181	112.3	[2] 21	574.67
132	256.5	10	483.32	182	246.0	[2] 15	936.80
133	100.0	10	240.09	183	278.0	[2] 15	1,025.73
134	108.8	12	357.44	184	15.0	[2] 12	198.64
135	796.3	24	3,575.91	185	150.0	10	467.31
136	165.0	10	340.22	186	25.0	[2] 10	63.71
137	199.2	12	636.28	187	144.6	15	489.58
	115.0	10		188	448.4	12	1,253.83
138	115.0	12	544.69	189	369.0	10	1,181.11
139	557.6	12	788.63	190	250.0	12	826.86
140	366.7	12	748.67	191	202.0	10	558.49
141	458.9	10	852.55	192	50.0	10	128.47
142	367.9	12	1,030.18	193	(1)	.....	.....
143	106.8	10	320.02	194	297.6	10	651.85
144	492.7	12	1,186.94	195	(1)	.....	.....
145	137.0	10	291.91	196	300.0	10	585.56
146	153.5	10	331.98	197	(1)	.....	.....
147	43.5	18	646.56				
	140.0	12		Total	23,189.81	.....	60,933.64
148	38.5	10	113.94				

[1] To be done in 1919.

[2] Repaving not reported.

TABLE 5.—*Basin construction from the appropriation for main and pipe sewers, fiscal year 1918.*

Order No.	Basins.	Total cost.	Order No.	Basins.	Total cost.
500	[1]	[2] $70.15	540	2	433.87
501	[1]	170.69	541	6	753.36
503	1	113.73	542	1	128.48
504	1	90.49	543	1	112.34
506	2	208.32	548	4	540.33
511	1	216.05	553	1	[2] 641.03
515	3	427.23	555	1	111.32
518	1	177.95	557	3	318.35
522	2	167.47	558	1	123.13
524	1	116.97	560	4	[2] 390.45
526	1	109.36	561	1	[2] 237.34
529	[1]	212.86	563 [3]	.....	.....
530	1	83.10			
538	3	378.45	Total	46	6,904.12
539	4	571.30			

[1] Basin connection. [2] Repaving not reported. [3] To be done in 1919.

TABLE 6.—*Sewer construction from the appropriation for main and pipe sewers, fiscal year 1918.*

Order No.	Length, etc.	Size.	Total cost.	Order No.	Length, etc.	Size.	Total cost.
		Inch.				*Inch.*	
502	House laterals	.....	[1] $191.93	531	10.5 feet	12	$89.50
505	32 feet	18	203.71	532	61 feet	8	[1] 225.45
	15 feet	12		533	231.7 feet	10	[1] 712.02
507	32 feet	24	390.77	534	48 feet	15	475.17
508	1 manhole	.....	72.06	535	House laterals	.....	164.44
509	.....do	.....	79.46	536	157.3 feet	18	1,028.23
510	120 feet	12	590.74	537	69 feet	15	525.25
512	54 feet	24	442.25	544	63 feet	15	408.54
513	372 feet	21	1,687.55	545	375 feet	12	1,317.34
514	255 feet	12	370.78	546	21 feet	12	100.41
	41 feet	15		547	Abandoned sewer	.....	6.60
516	85.2 feet	21	864.12	549	44.5 feet	15	1,865.68
517	17.5 feet	24	623.47		375 feet	12	
	84.5 feet	15		550	24 feet	12	97.97
519	66 feet	24	1,105.66	551 [2]	.....	.....	.....
520	19.4 feet	10	538.73	552 [2]	.....	.....	.....
	43.3 feet	12		554	30 feet	12	7.13
	40.9 feet	18		556	1 manhole	.....	435.80
521	1 manhole	.....	66.63	559 [2]	.....	.....	.....
523	257 feet	15	855.75	562	Tide-gate chamber	.....	[1] 1,377.38
525	1 manhole	.....	78.56	564	105 feet	12	277.66
527	Regulator chamber	.....	1,381.42				
528	262 feet	12	1,048.70		Total	.....	19,706.86

Total length, 3,411.80 feet.

[1] Repaving not reported. [2] To be done in 1919.

TABLE 7.—*Sewer construction from the appropriation for suburban sewers, fiscal year 1918.*

Order No.	Length, etc.	Size.	Total cost.	Order No.	Length, etc.	Size.	Total cost.
		Inch.				*Inch.*	
800	Manhole		$51.27	829	92.6 feet	12	$303.40
801	121 feet	24 by 30	32.12	830	82.5 feet	18	[2] 3,022.91
802[1]					97.71 feet	48	
803	Manhole		63.14	831	2 basins		[2] 187.55
804	14.5 feet	15	102.47	832	1 basin		[2] 164.74
805	5 basins		683.58	833	do		[2] 165.06
806	1 basin		72.18	834	836.50 feet	18	3,179.81
807	2 basins		192.21		42 feet	12	
808	3 basins		315.10	835	Raised 6 manholes to grade		420.36
809	2 basins		168.22				
810	do		321.50	836	39.40 feet	21	302.64
811	Façade wall and gate-chamber		2,581.53	837	1 basin		90.22
				838	126.3 feet	21	745.75
812	1 basin		123.89	839	1 basin		318.09
813	520.9 feet	18	2,871.09	840	100 feet	60 by 60	1,260.03
	5.6 feet	21		841	2 basins		[2] 201.70
814	2 basins		216.53	842	1 basin		[2] 141.44
815	3 basins		198.90	843	do		[2] 120.78
816	4 basins		342.72	844	do		[2] 163.56
817	1 basin		99.22	845	do		116.79
818	do		67.34	846	100 feet	60 by 60	1,445.01
819	do		65.38	847	288 feet	18	1,076.71
820	do		119.92	848[4]			
821	do		99.77	849	1 basin		118.93
822	do		106.47	850	Junction chamber		1,070.74
823	do		[2] 116.72	851	2 basins		284.94
824	2 basins		[2] 149.08	852	Junction chamber		987.91
825	15 feet	15	[3] 567.00	853	51 feet	8	68.96
	9 feet	18		854	Junction chamber		186.64
	51 feet	21		855	Apron and side walls		120.82
826	2 basins		242.91	856[1]			
827	60 feet	24	[3] 1,142.50	857	Cleaning by-pass		35.50
	12 feet	21					
828	21.3 feet	12	77.55		Total		27,491.30

Total length, 2,686.31 feet.

[1] To be done in 1919.
[2] Repaving not reported.
[3] Paid from appropriation for improvements and repairs, District of Columbia, 1918—repairs to suburban roads.
[4] Canceled.

TABLE 8.—*Sewer construction and other work under the whole cost system from miscellaneous trust fund deposits for fiscal year 1918.*

Order No.	Location.	Length.	Size.	Remarks.	Amount of deposit.	Cost of work.	Amount returned.	For whom done.
		Feet.	*Ft. in.*					
1000	Van Ness Street and Pierce Mill Road NW.	24	12		$100.00	$39.67	$60.33	Washington Gas Light Co.
1001	Calvert Street NW. at Twenty-eighth Street.	65 110 547 95	4 0 3 3 3 6 18		10,850.00	10,850.00		D. J. Howell.
1002	Foot of roadway leading to premises No. 3051 Q Street NW.			2 special basins	100.00	100.00		Allan E. Walker Co.
1003	Southeast corner Fifteenth and F Streets and northeast corner Pennsylvania Avenue NW.			2 catch basins	300.00	297.68	2.32	R. S. Downs.
1004	Crossing, Eighteenth Street at F Street NW.	70.5	15		341.72	228.82	112.90	Capital Traction Co.
1005	G Street, between Fourteenth and Fifteenth: Fifteenth Street, between F and G Streets NW.	493.80	18	3 manholes	8,250.00	8,187.50	62.50	Jas. A. Cahill.
1006	Cleveland Avenue NW., between Twenty-ninth and Thirtieth Streets.	1,147	3 0		9,752.71	9,329.33	423.38	D. J. Howell.
1007	Thirteenth Street NW. crossing Randolph	53.7	12	1 manhole	200.00	194.71	5.29	Thrift Building Co.
1008	Square No. 2865 (Twelfth, Thirteenth, Clifton, and Euclid Streets NW.).	15	10		75.00	41.76	33.24	Jos. W. Collins.
1009	Southwest corner Nineteenth and G Streets NW.			Basin connection lowered	33.93	33.93		Capital Traction Co.
1010	Fifteenth Street and New York Avenue NW.			1 manhole	20.95	20.95		Do.
1011	Q Street NW., between Twenty-fifth and Twenty-sixth.	101.50	8		125.00	93.70	31.30	Mrs. E. H. Masson.
1012	Various locations			Hauling coal	842.13	842.13		J. Maury Dove Co.
1013	Alley, Square 144 (Eighteenth, Nineteenth, D, and E Streets NW.)	42	12		125.00	95.11	(1)	Potomac Electric Power Co.
1014	Eighteenth Street and Virginia Avenue NW.	48.3	15	1 catch basin	103.39	103.39		Capital Traction Co.
1015	Rhode Island Avenue NE., between Sixth and Seventh Streets.	40	12	1 manhole	250.00	235.30	(1)	G. B. Mullen Co.
1016	Sixteenth Street SE., between V and W	45	12		150.00	131.53	18.47	Geo. H. Guerdrum.
1017	B Street NW., between Twentieth and Twenty-first (north side).			1 manhole	200.00	147.01	52.09	W. G. Cornell Co.
1018	First and Van Buren Streets NW	3	10		25.00	17.55	7.45	C. W. Knight.
1019	Eye Street NW., between Vermont Avenue and Sixteenth Street.[2]							
1020	Fourteenth Street NW., between B and C			Flume in sewer	50.00	2.20	(1)	
	Total	2,900.80			31,894.83	30,992.27	809.27	

[1] Repaving not reported.

[2] Canceled.

TABLE NO. 9.—*Sewer construction and other work from miscellaneous appropriations, fiscal year 1918.*

Order No.	Location.	Work done.	Total cost.	Appropriation.
1100	Northwest corner Fifteenth and B Streets SE.	1 basin	$100.22	Improvements and repairs, District of Columbia, 1917, southeast schedule.
1101	Fourteenth Street SE., C to E Streets.	(1)		
1102	Twenth-sixth and K Streets NW	1 basin	123.12	Improvements and repairs, District of Columbia, 1918, northwest schedule.
1103	First Street, east from B Street SE. to C Street NE.	5 basins (adjusted)	28.09	Improvements and repairs, District of Columbia, 1918, repairs to streets.
1104		(1)		
1105	Fourth and Eye Streets NE	3 basins (reconstruct)	17.72	Do.
1106	Northeast and northwest corners Seventeenth and U Streets north side U Street, west of Sixteenth Street NW.	3 basins (adjusted)	71.17	Do.
1107	Alley of square 2539	1 basin	92.59	Improvements and repairs, District of Columbia, 1918, assessment and permit work, streets.
1108	Alley square 2540	do	96.62	Improvements and repairs, District of Columbia, 1917, assessment and permit work, streets.
1109		(1)		
1110	Twenty-seventh and K Streets NW.	1 basin	131.61	Improvements and repairs, District of Columbia, 1918, northwest schedule.
1111	Fourteenth and Eye Streets NW. (southeast, southwest, northeast, and northwest corners).	4 basins	382.00	Improvements and repairs, District of Columbia, 1918, repairs to streets.
1112	Northwest corner Fourteenth and D Streets SW.	1 basin	195.92	Improvements and repairs, District of Columbia, 1918, between B and D Streets.
1113	Ninth Street and Florida Avenue NW.	do	95.39	Suburban roads and streets, District of Columbia, 1918, Ninth Street, U to V.
1114	Thirteenth and E Streets NW. (northeast and northwest corners).	2 basins	154.77	Improvements and repairs, District of Columbia, 1918.
1115	Northeast corner Delaware Avenue and Canal Street SW.	1 basin	107.53	Improvements and repairs, District of Columbia, 1918, southwest schedule.
1116	Northwest corner Fourteenth and L Streets NE., corner Fourteenth and L Streets, and L Street east of Fourteenth Street NW.	3 basins	240.05	Repairs to streets, District of Columbia, 1918.
1117	K Street west of Fourteenth, northwest corner Fourteenth and K Streets NW.	2 basins	259.08	Do.
1118	South side of K Street, west of Fourteenth Street NW.	1 basin (abandoned)	6.91	Do.
1119		(1)		
1120	G street SW., First Street, and Delaware Avenue.	3 basins	300.86	Improvements and repairs, District of Columbia, 1918, southwest schedule.
1121	West side First Street SW., south of Delaware Avenue.	1 basin	119.35	Do.
1122	F Street, east of Water, Twelfth and F Streets, Eleventh and F Streets SW.	4 basins	376.63	Improvements and repairs, District of Columbia, 1917, southwest schedule.
1123	Champlain Avenue NW, Kalorama to Columbia Road.	3 basins (adjusted)	71.57	Suburban roads and streets, District of Columbia, 1918.
1124	Northwest corner Fourteenth Street and Pennsylvania Avenue NW.	1 basin	156.18	Repave roadway Fourteenth Street, E to F Streets, District of Columbia, 1917.
1125	First Street and Pennsylvania Avenue NW.	2 basins	212.01	Improvements and repairs, District of Columbia, 1918.
1126	North and south sides of G Street, west of 5th Street NW.	do	248.06	Miscellaneous trust fund deposits, District of Columbia, 1918.
1127		(1)		
1128	Georgia Avenue and New Hampshire Avenue NW.	1 basin	91.91	Improvements and repairs, District of Columbia, 1918, assessment and permit work, streets.
1129	Northeast corner of First and O Streets SW.	do	71.38	Improvements and repairs, District of Columbia, 1918, southwest schedule.

[1] Canceled.

TABLE No. 9.—*Sewer construction and other work from miscellaneous appropriations, fiscal year 1918*—Continued.

Order No.	Location.	Work done.	Total cost.	Appropriation.
1130	Northeast and northwest corners Twelfth and G Streets, northwest and northeast corners Twelfth and H Streets NW.	4 basins	$365.88	Improvements and repairs, District of Columbia, 1918, repairs to streets.
1131	Northeast corner Fourteenth and C Streets, northeast corner Fourteenth and D Streets, SW.	2 basins	187.29	Improvements and repairs, District of Columbia, 1918, southwest schedule.
1132	Southeast and southwest corners Twelfth and H Streets NW.	2 manholes	151.09	Improvements and repairs, District of Columbia, 1918, repairs to streets.
1133	West side Twentieth Street NW. just south of K Street.	1 basin	130.86	Improvements and repairs, District of Columbia, 1918, repave Twentieth Street, I to K Streets.
1134	Georgia Avenue and Taylor Street, Kansas Avenue, between Georgia Avenue and Eighth Street NW.	2 basins	124.67	Improvements and repairs, District of Columbia, 1918, assessment and permit work, streets.
1135	Northeast and southeast corners Twenty-sixth and L Streets NW.	.....do	138.48	Improvements and repairs, District of Columbia, 1918, repairs to streets.
1136	Northeast corner Eleventh and D Streets SE.	1 basin	68.13	Improvements and repairs, District of Columbia, 1918, southeast schedule.
1137	Eighteenth Street and Virginia Avenue NW.	Adjusted basin	65.61	Improvements and repairs, District of Columbia, 1918, northwest schedule.
1138	Northeast and southeast corners O and Water Streets SW.	2 basins	149.04	Improvement and repairs, District of Columbia, 1918, southwest schedule.
1139	Southeast and northeast corners Twenty-fifth Street and Virginia Avenue NW.	.....do	210.68	Improvements and repairs, District of Columbia, 1918, repairs to streets.
1140	Northeast corner Wisconsin and Dunbarton Avenue NW	1 basin	117.52	Do.
1141	Southeast corner Fifteenth and New York Avenue NW.	.....do	180.29	Do.
1142	Northwest corner Fifteenth Street and Pennsylvania Avenue NW.	.....do	98.21	Do.
1143	D Street NW., between Thirteen and one-half and Fourteenth Streets.	Excavating shaft	106.17	Contingent and miscellaneous expenses, 1918, tools, equipment, heating, lighting, central garage.
1144		(1)		
1145	Various locations	Hauling snow	1,314.43	Streets, District of Columbia, 1918, cleaning.
1146	Beach Drive between Boulder Bridge and Military Road NW.	Refilling over line of trench.	102.85	Sewage disposal system, District of Columbia, 1917.
1147		(2)		
1148	Northwest corner Nineteenth Street and Virginia Avenue NW.	1 basin	130.68	Improvements and repairs, District of Columbia, 1918. northwest schedule.
1149	Northeast corner Nineteenth and C Streets NW.	.....do	101.51	Do.
1150	Pennsylvania Avenue, between Eleventh and Seventeenth Streets NW.	Rope barricade	260.79	Deposit of Corcoran Thom.
1151	Northeast corner Fifteenth Street and New York Avenue NW.	1 basin	160.19	Improvements and repairs, District of Columbia, 1918. repairs to streets.
1152	Northwest corner Twenty-seventh and K Streets NW.	Test holes	250.10	Sewage disposal system, District of Columbia, 1918, Upper Potomac interceptor.
1153	R Street and Avon Place NW..	125 feet of 12-inch pipe.	340.43	Improvements to public schools, District of Columbia, 1918.
1154	K Street NW., between Twenty-fourth and Twenty-seventh Streets NW.	5 basins	585.87	Improvements and repairs, District of Columbia, 1918, repairs to streets.
1155	Nineteenth Street NW., between E and G Streets.	3 basins	310.14	Do.
1156	I Street NW., between Madison Place and Sixteenth Street.		4,190.37	National security and defense, Arlington Building.
	Total		13,492.02	

[1] Canceled.

[2] To be done in 1919.

TABLE 10.—*Inspectors and other employees of the sewer division, temporarily employed, and the appropriations from which paid, fiscal year 1918.*

Appropriations.	Inspectors.	Overseers.	Other employees.	Total.
Construction, sewerage system:				
Main and pipe sewers	$1,226.81	$504.00	$1,360.75	$3,091.56
Suburban sewers	2,330.90	1,307.49	4,118.75	7,757.14
Assessment and permit work	1,154.93	1,501.35	3,399.00	6,055.28
Construction, sewage-disposal system:				
Anacostia main interceptor		407.50		407.50
Rock Creek main interceptor	884.75			884.75
Maintenance: Cleaning and repairing	407.63	585.00	191.25	1,183.88
Total	6,005.02	4,305.34	9,069.75	19,380.11

TABLE 11.—*Average cost of constructing pipe sewers and storm-water receiving basins for fiscal year 1918.*

Size of sewer.	Unit cost per foot.		Total cost per foot.
	Labor.	Material.	
8-inch diameter	$0.77	$0.42	$1.19
10-inch diameter	.98	.66	1.64
12-inch diameter	1.47	.92	2.39
15-inch diameter	1.56	1.14	2.70
18-inch diameter	1.71	1.78	3.80
21-inch diameter	2.02	2.49	4.20
24-inch diameter	2.16	2.79	4.95
Storm-water receiving basins, each	45.17	42.28	87.45

TABLE 12.—*Average cost of constructing pipe sewers for 15 years.*

Year.	8-inch diameter.		10-inch diameter.		12-inch diameter.		15-inch diameter.		18-inch diameter.		21-inch diameter.		24-inch diameter.	
	Labor.	Material.	Labor.	Material.	Labor.	Material.	Labor.	Material.	Labor.	Material.	Labor.	Material.	Labor.	Material.
1904	$0.97	$0.36	$0.92	$0.55	$1.17	$0.65	$1.45	$0.81	$1.61	$0.91	$1.94	$1.24	$2.24	$1.47
1905	.98	.38	.96	.55	1.19	.60	1.41	.77	1.45	.89	1.92	1.01	1.87	1.43
1906	.87	.33	1.19	.47	1.26	.54	1.41	.67	1.53	.78	1.88	.93	2.45	1.24
1907	1.42	.43	1.43	.48	1.30	.56	1.46	.70	1.82	.85	2.09	.98	2.78	1.26
1908	1.34	.42	1.26	.50	1.44	.61	1.69	.75	1.91	.90	1.74	1.14	3.65	1.50
1909	1.34	.36	1.16	.36	1.46	.46	1.59	.56	1.58	.62	1.67	1.07	1.91	1.18
1910	1.00	.29	.99	.35	1.12	.43	1.19	.52	1.49	.66	1.52	.85	1.72	1.14
1911	1.01	.27	1.02	.32	1.17	.40	1.36	.52	1.64	.67	1.50	.75	1.82	1.08
1912	1.06	.25	1.08	.33	1.20	.39	1.46	.56	1.63	.67	1.70	.88	1.76	.98
1913	1.02	.26	1.07	.29	1.35	.38	1.53	.58	1.74	.75	1.93	1.08	2.20	1.28
1914	.78	.28	1.08	.45	1.32	.51	1.44	.69	1.56	.89	1.69	1.34	2.11	1.41
1915	.58	.19	1.12	.42	1.25	.51	1.56	.67	1.63	.89	1.89	1.18	1.78	1.45
1916	.76	.25	1.00	.36	1.05	.43	1.31	.62	1.49	.72	1.87	1.13	2.11	1.16
1917	.79	.40	.85	.44	.96	.56	1.11	.68	1.19	.95	1.25	1.31	1.31	1.37
1918	.77	.42	.98	.66	1.47	.92	1.56	1.14	1.71	1.78	2.02	2.49	2.16	2.79

TABLE 13.—*Contract prices for materials for 15 years.*

Year.	Cement per barrel.	Sand per cubic yard.	Gravel per cubic yard.	Terra-cotta pipe, linear foot.						
				8-inch	10-inch	12-inch	15-inch	18-inch	21-inch	24-inch
1904	$1.75	$0.85	$0.85	$0.12	$0.228	$0.297	$0.401	$0.5049	$0.7425	$0.965
1905	1.13	.81	.85	.14	.20	.29	.40	.50	.74	.96
1906	1.35	.85	1.05	.125	.1647	.2236	.2997	.3672	.5454	.7263
1907	1.55	.74	.97	.155	.195	.261	.353	.443	.5454	.848
1908	1.52	.84	1.04	.155	.225	.30	.405	.51	.75	.975
1909	1.20	.55	.75	.155	.1707	.239	.3233	.4066	.5975	.7775
1910	.975	.54	.65	.125	.15	.20	.27	.3825	.5625	.73125
1911	.99	.395	.485	.115	.175	.22	.30	.42	.55	.715
1912	.98	.345	.435	.121	.176	.22	.31	.40	.59	.715
1913	.94	.345	.435	.105	.15	.18	.351	.494	.78	.845
1914	1.11	.54	.69	.11	.256	.25	.432	.608	.96	1.04
1915	1.04	.54	.69	.11	.23	.245	.43	.60	.96	1.04
1916	1.00	.54	.69	.11	.16	.21	.284	.40	.63	.6825
1917	1.33	.59	.74	.15	.23	.28	.39	.551	.90	.975
1918	1.95	.69	.99	.18	.42	.54	.72	1.00	2.00	2.25

TABLE 14.—*Maintenance work, sewerage system, for 10 years.*

	1918	1917	1916	1915	1914
Main sewers, cleaned.....feet..	595	5,467	3,743	4,885	1,113
Pipe sewers, cleaned.....do....	169,582	189,796	156,733	156,773	145,767
Pipe sewers, flushed.....do....	5,222,929	5,983,299	6,949,719	6,077,129	6,339,122
Manholes flushed.....	13,083	15,597	17,611	15,473	17,208
Sumps, regulators, gates cleaned and inspected.....	3,733	3,662	2,102	3,618	4,222
Basins flushed.....	17,984	17,938	15,793	15,242	18,586
Basins cleaned.....	30,481	39,256	45,514	51,201	45,502
Sludge removed:					
Pipe sewers.....cubic feet..	5,450	5,837	5,220	4,499	4,079
Basins.....do....	217,662	191,288	198,128	191,928	160,660
Sediment chamber.....do....	55,323	75,195	71,500	71,100	62,856
Screens.....pounds..	948,118	884,755	804,866	708,388	798,666
Main sewer inspected.....miles..	144.97	142.93	139.53	137.36	134.00
Pipe sewer inspected.....do....	989.00	1,133.00	1,316.00	1,150.00	1,200.00
Basins repaired.....	148	178	148	163	124

	1913	1912	1911	1910	1909
Main sewers cleaned.....feet..	4,525	4,071	300	1,185	11,624
Pipe sewers cleaned.....do....	123,545	122,838	161,190	149,626	153,145
Pipe sewers flushed.....do....	6,705,367	5,906,405	5,685,423	3,717,332	1,873,142
Manholes flushed.....	18,594	16,733	15,994	11,943	5,295
Sumps, regulators, gates cleaned and inspected.....	3,949	2,245	530	568	11
Basins flushed.....	18,416	5,293	11,950	18,884	2,829
Basins cleaned.....	40,244	38,760	60,379	57,753	52,634
Sludge removed:					
Pipe sewers.....cubic feet..	3,723	2,479	3,538	5,052	3,334
Basins.....do....	168,696	147,741	166,428	190,204	188,460
Sediment chamber.....do....	66,744	53,140	58,131	58,577	61,695
Screens.....do....	869,640	1,084,128	833,617	890,230	16,394
Main sewers inspected.....miles..	130.90	126.24	122.78	114.00	114.00
Pipe sewers inspected.....do....	1,270.00	491.47	469.42	448.78	346.00
Basins repaired.....	117	141	155	249	123

TABLE 15.—*Summary of sewerage system for 25 years.*

Fiscal year.	Total length.			Total cost.		Annual cost maintenance and operation.	
	Trunk sewers.	Pipe sewers.	All sewers.	Sewerage system.[1]	Sewage disposal system.	Sewerage system.	Sewage disposal system.[2]
	Miles.	*Miles.*	*Miles.*				
1894	71.32	250.13	321.45	$8,298,931.62	.....	$45,000.00	.....
1895	74.48	260.20	334.68	8,476,431.62	.....	45,000.00	.....
1896	77.65	270.28	347.93	8,661,731.62	.....	45,000.90	.....
1897	81.36	284.06	365.42	8,901,731.62	.....	45,000.00	.....
1898	83.92	298.91	382.93	9,047,731.62	.....	50,000.00	.....
1899	85.65	307.36	393.01	9,183,731.62	.....	50,000.00	.....
1900	88.30	317.20	405.50	9,309,731.62	.....	50,000.00	.....
1901	90.89	327.86	418.75	9,515,731.62	.....	50,000.00	.....
1902	93.49	338.13	431.62	9,696,731.62	.....	58,000.00	.....
1903	96.31	351.73	448.04	9,817,731.62	.....	58,000.00	.....
1904	99.12	357.70	456.82	9,940,731.62	.....	58,000.00	.....
1905	103.21	365.60	468.81	10,040,881.62	.....	58,000.00	.....
1906	109.09	375.26	484.35	10,128,881.62	.....	42,000.00	.....
1907	112.20	389.24	501.44	10,363,881.62	$3,714,823.00	38,000.00	[3] $37,295.00
1908	113.94	407.24	521.18	10,536,681.62	3,952,768.65	44,500.00	[3] 38,625.00
1909	117.24	424.02	541.26	10,688,681.62	4,031,888.27	45,000.00	58,000.00
1910	119.20	448.78	567.98	10,860,556.62	4,095,630.70	48,500.00	58,000.00
1911	122.78	469.42	592.20	11,204,188.79	4,146,228.01	50,000.00	58,000.00
1912	126.01	492.52	618.53	11,539,374.28	4,228,555.94	50,000.00	59,500.00
1913	130.90	513.38	644.28	11,922,177.04	4,366,524.43	50,000.00	59,500.00
1914	133.50	527.99	661.49	12,470,940.74	4,495,830.13	50,500.00	62,000.00
1915	137.36	544.75	682.11	13,032,082.86	4,624,186.31	50,500.00	64,000.00
1916	139.53	562.53	702.06	13,294,695.25	4,671,279.19	50,000.00	64,500.00
1917	142.93	574.44	717.37	13,569,830.21	4,685,165.71	50,000.00	64,500.00
1918	144.97	585.87	730.84	13,949,036.45	4,720,324.92	50,000.00	64,500.00

[1] Exclusive of sewage disposal system.
[2] The sewage disposal system went into operation July 1, 1906.
[3] Handling a part of the sewage only during these years.

TABLE 16.—*Rights of way acquired for sewer extensions, fiscal year, 1918*

For combined system trunk sewer (Rock Creek Main interceptor), in line of Twenty-eighth Street, between Calvert Street and Rock Creek Drive through parcel 54/25.[1]

For combined system trunk (Anacostia main interceptor) from V to W Streets (property of Baltimore & Ohio R. R.) through parcel 225/3.[2]

For combined system Stickfoot Branch trunk sewer, between Alexandria Branch, Baltimore & Ohio Railroad, and Nichols Avenue, through lot 820, square 5862.[1]

For combined system Stickfoot Branch trunk sewer, between Alexandria Branch, Baltimore & Ohio Railroad, and Nichols Avenue, through lot 65, square 5861.[2]

For combined system Piney Branch trunk sewer, in line of Fifteenth Street, between Varnum and Webster Streets, through parcel 84/50.[1]

For combined system service sewer between Garfield Street and Cathedral Avenue, through lots 1, 16, 17, and 32, square 2117.[2]

TABLE 17.—*Electric conduits laid July 1, 1917, to July 1, 1918.*

Number of ducts.	Potomac Electric Power Co.		Chesapeake & Potomac Telephone Co.		Capital Traction Co.		Total.	
	Conduit.	Duct.	Conduit.	Duct.	Conduit.	Duct.	Conduit.	Duct.
	Feet.	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*
1	3,058	3,058	760	760	.....	.....	3,818	3,818
2	1,337	2,674	14,388	28,776	.....	.....	15,725	31,450
3	.....	.....	.....	.....	.....	.....	.....	.....
4	18,235	72,940	12,920	51,680	971	3,884	32,126	128,504
6	11	66	9,138	54,828	.....	.....	9,149	54,894
8	3,875	30,900	5,927	47,416	.....	.....	9,802	78,316
10	729	7,290	6,513	65,130	.....	.....	7,242	72,420
12	1,741	20,892	2,942	35,304	.....	.....	4,683	56,196
16	1,039	16,634	1,240	19,840	563	9,008	2,842	45,482
20	349	6,980	572	11,440	.....	.....	921	18,420
24	.....	.....	328	7,872	.....	.....	328	7,872
26	.....	.....	126	3,276	.....	.....	126	3,276
Total	30,374	161,434	54,854	326,322	1,534	12,892	86,762	500,648

[1] Consideration paid.

[2] Voluntary dedication.

TABLE 18.—*Summary of electric conduits laid from Mar. 27, 1900, to July 1, 1918.*

Number of ducts.	Potomac Electric Power Co.		Chesapeake & Potomac Telephone Co.		Capital Traction Co.		Washington Railway & Electric Co.	
	Conduit.	Duct.	Conduit.	Duct.	Conduit.	Duct.	Conduit.	Duct.
	Feet.	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*
1	85,533	85,533	56,087	56,087				
2	160,181	320,362	329,249	658,498	15,742	31,484	13	26
3	236	708	5,926	17,778				
4	524,929	2,099,716	199,495	797,980	23,652	94,608	33,414	133,656
5								
6	46,127	276,762	108,576	651,456	8,173	49,038	5,117	30,702
7			82	574	29	203		
8	101,063	808,404	59,871	478,968	15,304	122,432	19,086	152,688
9	7,325	65,925	114	1,026				
10	850	8,500	29,700	297,000	32	320	8,275	82,750
12	52,935	635,220	14,278	171,336	908	10,896	11,458	137,496
13	374	4,862	212	2,756				
14	1,224	17,136	3,831	53,634	4,306	60,284	1,880	26,320
15	68	1,020			28	420		
16	6,180	98,890	9,276	148,416	1,042	16,672		
17			636	10,812				
18			4,149	74,682			2,214	39,852
20	1,079	21,580	1,979	39,580	1,362	27,240		
22			823	18,106	9,109	200,398	134	2,948
24	3,176	76,224	3,069	73,656				
25			304	7,600				
26			126	3,276	280	7,280		
28	2,227	62,356					87	2,436
30	53	1,590	313	9,390				
32	77	2,464	485	15,520	1,002	32,064		
36	3,854	138,744	26	936	125	4,500		
38							193	7,334
40			1,589	63,560				
44	446	9,624						
56			749	41,944				
58	7	406						
64	106	6,784	176	11,264				
70			53	3,710				
72			118	8,496				
82			35	2,870				
Total	998,050	4,752,810	831,327	3,720,911	81,094	657,839	81,871	616,208

Number of ducts.	Western Union Telegraph Co.		Postal Telegraph Co.		Total.	
	Conduit.	Duct.	Conduit.	Duct.	Conduit.	Duct.
	Feet.	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*
1	515	515	13,831	13,831	155,966	155,966
2	3,409	6,818	1,126	2,252	509,720	1,019,440
3	6,975	20,925			13,137	39,411
4	7,993	31,972	35,428	141,712	824,911	3,299,644
5	4,177	20,885			4,177	20,885
6	4,232	25,392	17,313	103,878	189,538	1,137,228
7					111	777
8			1,140	9,120	196,464	1,571,612
9					7,439	66,951
10	183	1,830			39,040	390,400
12			283	3,396	79,862	953,344
13	309	4,017			895	11,635
14					11,241	157,374
15	44	660			140	2,100
16					16,498	263,978
17					636	10,812
18					6,363	114,534
20					4,420	88,400
22					10,066	221,452
24					6,245	149,880
25					304	7,600
26					406	10,556
28					2,314	64,792
30					366	10,980
32					1,564	50,048
36					4,005	144,180
38					193	7,334
40					1,589	63,560
44					446	9,624
56					749	41,944
58					7	406
64					282	18,048
70					53	3,710
72					118	8,496
82					35	2,870
Total	27,837	113,014	69,121	274,189	2,089,300	10,134,971

TABLE 19.—*Electric conduits, lengths laid each year to July 1, 1918.*

Fiscal year.	Potomac Electric Power Co.		Chesapeake & Potomac Telephone Co.		Capital Traction Co.		Washington Railway & Electric Co.	
	Conduit.	Duct.	Conduit.	Duct.	Conduit.	Duct.	Conduit.	Duct.
	Feet.	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*
Laid prior to Mar. 27, 1900	343,885	1,813,866	79,920	698,920	48,218	399,851	75,743	569,332
1901	16,387	65,952	876	4,690	.....	.....	88	704
1902	8,098	89,958	.....	.....	.....	.....	.....	.....
1903	24,655	105,592	123,604	640,448	.....	.....	.....	.....
1904	15,635	65,412	35,905	138,649	.....	.....	.....	.....
1905	13,798	56,892	39,409	147,002	.....	.....	4,670	37,360
1906	50,057	287,311	80,433	278,683	.....	.....	.....	.....
1907	38,053	252,741	75,110	281,405	5,285	29,652	.....	.....
1908	39,705	154,940	58,005	228,725	23	92	.....	.....
1909	58,607	235,224	45,919	172,768	11,769	90,660	859	6,644
1910	46,096	159,422	56,582	140,859	263	1,788	420	1,804
1911	56,029	240,518	44,822	297,752	913	6,318	.....	.....
1912	63,841	336,353	19,966	45,697	9,417	58,548	42	168
1913	39,883	146,117	22,980	64,630	2,300	18,400	.....	.....
1914	45,018	170,578	24,391	51,778	.....	.....	34	136
1915	35,488	130,400	19,059	48,938	.....	.....	.....	.....
1916	40,894	164,136	16,847	35,513	1,230	37,254	15	60
1917	31,547	115,964	32,645	118,132	142	2,384	.....	.....
1918	30,374	161,434	54,854	326,322	1,534	12,892	.....	.....
Total	998,050	4,752,810	831,327	3,720,911	81,094	657,839	81,871	616,208

Fiscal year.	Western Union Telegraph Co.		Postal Telegraph Cable Co.		Total.	
	Conduit.	Duct.	Conduit	Duct.	Conduit.	Duct.
	Feet.	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*
Laid prior to Mar. 27 1900	.....	.....	14,663	18,944	562,429	3,500,913
1901	.....	.....	.....	.....	17,351	71,346
1902	.....	.....	.....	.....	8,098	89,958
1903	.....	.....	.....	.....	148,259	746,040
1904	.....	.....	.....	.....	51,540	204,061
1905	.....	.....	.....	.....	57,877	241,254
1906	10,635	44,995	.....	.....	141,125	610,989
1907	383	1,710	.....	.....	118,831	565,508
1908	11,463	51,775	.....	.....	109,196	435,532
1909	2,322	7,515	.....	.....	119,476	512,811
1910	329	652	.....	.....	103,960	304,525
1911	.....	.....	531	531	102,295	545,119
1912	.....	.....	50,238	232,992	143,504	673,758
1913	.....	.....	2,915	15,704	68,078	244,851
1914	607	1,214	.....	.....	70,050	223,706
1915	763	1,474	410	2,460	55,720	183,272
1916	980	3,153	364	3,558	60,330	243,674
1917	355	526	.....	.....	64,898	237,006
1918	.....	.....	.....	.....	86,762	500,648
Total	27,837	113,014	69,121	274,189	2,089,300	10,134,971

TABLE 20.—*Gas mains, laid by sizes, July 1, 1917, to July 1, 1918.*

Size of mains.	Washington Gas Light Co.	Georgetown Gas Light Co.	Total.
	Linear feet.	*Linear feet.*	*Linear feet.*
3-inch	185	.....	185
4-inch	7,448	90	7,538
6-inch	19,151	862	20,013
10-inch	128	.....	128
12-inch	1,527	3,218	4,745
16-inch	3,000	.....	3,000
20-inch	383	.....	383
Total	31,822	4,170	35,992

TABLE 21.—*Gas mains, laid by sizes, July 1, 1907, to July 1, 1918.*

Size of mains.	Washington Gas Light Co.	Georgetown Gas Light Co.	Total.
	Linear feet.	*Linear feet.*	*Linear feet.*
1¼-inch	9,298	3,120	12,418
2-inch	6,206	1,485	7,691
2½-inch	.....	620	620
3-inch	5,983	.....	5,983
4-inch	221,744	42,964	264,708
6-inch	257,965	60,148	318,113
8-inch	13,796	32,688	46,484
10-inch	5,493	4,107	9,600
12-inch	75,736	38,638	114,374
16-inch	6,959	234	7,193
20-inch	10,695	.....	10,695
24-inch	9,778	.....	9,778
30-inch	459	.....	459
Total	624,112	184,004	808,116

TABLE 22.—*Gas mains, lengths laid by years, July 1, 1907, to July 1, 1918.*

Fiscal year.	Washington Gas Light Co.	Georgetown Gas Light Co.	
	Linear feet.	*Linear feet.*	*Linear feet.*
1907	36,605	8,450	45,055
1908	61,642	10,777	81,419
1909	83,692	25,498	109,190
1910	69,237	2,202	71,439
1911	48,192	10,983	59,175
1912	88,583	50,178	138,761
1913	61,234	11,688	72,922
1914	48,475	5,839	54,313
1915	45,274	14,415	59,690
1916	29,577	24,940	45,517
1917	19,779	5,864	25,643
1918	31,822	4,170	35,992
Total	624,112	184,004	808,126

REPORT OF THE MUNICIPAL ARCHITECT.

WASHINGTON, D. C., *September 30, 1918.*

SIR: I have the honor to forward herewith the ninth annual report of the office of the municipal architect for the fiscal year ending June 30, 1918.

During the year 10 buildings were under construction, as follows:

Building.	Appropriation available.	Cost.	Completed or to be completed.
Fish wharf and market, Water Street between Eleventh and Twelfth Streets SW	Mar. 3, 1915	$116,476.77	Sept. —, 1918
Lumber for sheds	.....	658.00	Apr. —, 1918
Improvements on buildings adjoining	.....	360.00	June 10, 1918
Electric lighting fixtures, etc	.....	1,000.00	June 3, 1918
Removal of old structures	.....	100.00	July 11, 1918
Central Garage, D Street, between Thirteenth and Thirteen-and-a-half Streets NW	Sept. 1, 1916	13,526.12	Oct. 25, 1917
Removing steam line and reinstalling in branch tunnel	.....	450.00	
Elizabeth V. Brown School, No. 113, Connecticut Avenue, between McKinley and Northampton Streets NW	Sept. 1, 1916	68,772.86	Sept. 7, 1918
Sheds for the street cleaning department, between Thirteenth, Fourteenth, E, and G Streets SE	.....do.....	5,960.00	Aug. 25, 1917
Greenhouse for James Ormond Wilson Normal School, No. 162, Eleventh and Harvard Streets NW	.....do.....	2,000.00	Sept. , 1917
Garage for health department pound and stable, South Capitol and I Streets SW	Sept. 1, 1918	2,641.00	July 30, 1917
Farmers' Produce Market, third shelter, B Street, between Tenth and Twelfth Streets NW	Sept. 1, 1916	13,632.00	Feb. 11, 1918
Foundry addition to McKinley Manual Training School, No. 130, Seventh Street and Rhode Island Avenue NW	.....do.....	8,248.39	Sept. 15, 1918
Woodburn School, No. 101, addition for toilets, Riggs and Blair Roads, Woodburn	.....do.....	5,500.00	Oct. 1, 1918
Benning School, No. 48, addition for toilets, Anacostia Road, between Benning Road and F Street NE	.....do.....	6,000.00	Do.

Specifications and proposals were prepared for the following improvements:

Building.	Work.	Date of advertisement.
New Central High School	Scenery and fixtures	July 6, 1917
Elizabeth V. Brown School	Hauling boiler from Tenth Street wharf	July 7, 1917
District of Columbia repair shop	Freight elevator	July 11, 1917
Cranch School	Retubing two boilers	July 16, 1917
New Central High School	Dampproofing and covering with linoleum floor of housekeeping suite and kitchens.	Do.
Peabody School	Retubing boiler	Do.
New Central High School	Wire guards, metal screens, and water-closet inclosures.	Do.
Dennison School	Retubing boiler	Do.
McKinley Manual Training School	Construction foundry addition	July 19, 1917
New Central High School	Window guards for pool	July 21, 1917
Western High School	Boiler repairs	Do.
New Central High School	Wire guards, metal screens, and water-closet inclosures.	July 23, 1917
Grant School	Heating and ventilating system	July 24, 1917
Brookland School	Heating system	July 25, 1917
New Central High School	Wire guards for footlights on stage	July 27, 1917
Do	Dampproofing and covering with linoleum floor of housekeeping suite and kitchens.	July 30, 1917
Gales School	Repairs to boiler	Aug. 1, 1917
New Central High School	Tiling in housekeeping suite and bathrooms	Aug. 3, 1917
Tenley School	Repairs to boiler	Aug. 11, 1917
New Central High School	Stage equipment	Aug. —, 1917
Police department	Fourteen signs for stations	Aug. 14, 1917
Industrial Home School	Papering engineer's room	Aug. —, 1917
Public library	Repair of temperature control	Aug. 22, 1917
New Central High School	Blackboards	Sept. 1, 1917
Portable school No. 17	Hauling from Powell to E. V. Brown School site	Sept. 7, 1917
Elizabeth V. Brown School	Repairs to boilers	Sept. 12, 1917
Smallpox hospital	Retubing boiler	Sept. 24, 1917
Portable school No. 6	Hauling from M Street High to Burrville School site.	Oct. 4, 1917
Police court	Completion of floor in United States marshal's office.	Oct. 12, 1917
Washington Asylum Hospital	Repairs to boiler	Oct. 16, 1917
Petworth School	Construction of addition	Oct. 17, 1917
Washington Asylum	Construction hospital kitchen	Oct. 20, 1917
McKinley Manual Training School	Construction foundry addition	Nov. —, 1917
Dunbar High School	Ventilators (2)	Nov. 12, 1917
Woodburn School	Construction of addition for toilets	Nov. 21, 1917
Tennallytown police substation	Repairing electric lights	Dec. 5, 1917
Police station No. 1	Installation electric lights	Do.
Deanwood School	Construction of addition	Do.
Cardozo playgrounds	Construction of swimming pool	Dec. 17, 1917
Piney Branch Parkway	....do	Do.
New Central High School	Motor for washing machine	Dec. —, 1917
New Eastern High School	Razing of 15 brick houses on site	Jan. —, 1918
Police station No. 7	Alterations and cell work	Feb. 28, 1918
Workhouse (old)	Cutting cell divisions	Feb. —, 1918
Public schools	Photographs for slides for lecture work	Mar. 13, 1918
Woodburn School	Heating and ventilating for toilets	Mar. 18, 1918
Do	Waterproofing toilets and coal vault	Do.
Industrial Home School	Papering walls and ceilings	Mar. 26, 1918
Engine house No. 1	Steam-heating system	Mar. 28, 1918
Engine house No. 5	....do	Do.
Portable school No. 5	Hauling from M Street High to Armstrong Manual Training School site.	Apr. 10, 1918
Fish wharf and market	Improvements on adjoining buildings	Apr. —, 1918
Do	Electric lighting equipment	Apr. 15, 1918
McKinley Manual Training School	Rebuilding marble steps	May 9, 1918
Business High School	Repair to hot-water heater	Do.
District of Columbia workhouse	Construction of roof trusses for power house	May —, 1918
O Street Vocational School	Electric work	May 10, 1918
Engine house No. 14	Electric lighting system	Do.
B. B. French School	Wiring for motors	Do.
Franklin School	Electric work and fixtures	Do.
Smallwood School	....do	Do.
Elizabeth V. Brown School	Moving boilers	May —, 1918
Workhouse (old)	Assembling cells	May 16, 1918
Schools	Repairs to furnaces	May 20, 1918
Public library	Repairs to boiler	May 24, 1918
Buchanan School	New ventilating system	May 27, 1918
Bradley School	....do	Do.
A. Bowen School	....do	Do.
Corcoran School	....do	Do.
Bell School	....do	Do.
Portable schools	Blackboards for	Do.
McKinley Manual Training School	Rebuilding marble steps	May 29, 1918
Smallpox hospital	Retubing two boilers	May 31, 1918
Peabody School	Retubing boiler	Do.

Building.	Work.	Date of advertisement.
Portable schools	Ventilating furnaces for	May 31, 1918
Do	Construction of	June 1, 1918
New Central High School	Waterproofing toilets and rooms under stadium	June 3, 1918
Fish wharf and market	Razing old buildings	June 10, 1918
Elizabeth V. Brown School	Repairing stucco	June —, 1918
Harbor police station	Repairing piles	June 11, 1918
Fort Reno reservoir	Hot-water system for lodge, tower, and pump house	June 13, 1918
Reno School	Electric work	June 14, 1918
Phelps School site	Construction of pavilion	June 20, 1918
Health department clinic	Electric lighting and wiring for X-ray machine	Do.
Public library	Installation panel boards	June 21, 1918
New Central High School	Lighting for promenade	Do.
Grover Cleveland School	Lighting for roof garden and stairway	Do.
Thomson School	Lighting for play yard	Do.
Central Garage	Removing and reinstalling steam line	June —, 1918
Birney School	Wiring for stereopticon and moving-picture machine	June 21, 1918

CUBIC COST OF BUILDINGS.

In the annual reports of previous years tables have been submitted showing the cubic cost of buildings erected since 1896. The following table shows cost of buildings erected last year and some now under construction—where the cubic cost is a fair unit for comparison the advance in cost over 1898 figures is about 90 per cent. Comparison in cost of Washington school buildings and repairs with cost in other cities for buildings of similar materials and construction shows most favorably for this city.

Building.	Cost.	Cubic contents.	Cost per cubic foot.	Heating system.
		Feet.		
Elizabeth V. Brown School, No. 113, Connecticut Avenue, between McKinley and Northampton Streets NW.	[1] $68,772.86	507,111	$0.1356	Steam.
Fish wharf and market, Water Street, between Eleventh and Twelfth Streets SW.	[2] 116,476.77	589,071	.1977	Gas.
Central Garage, D Street, between Thirteenth and Thirteen and one-half Streets NW.	13,702.00	128,438	.106	Steam.
Sheds for street-cleaning department, between Thirteenth, Fourteenth, E, and G Streets SE.	5,960.00	75,827.2	.0785	Stoves.
Garage for health department pound and stable, South Capitol and I Streets SW.	2,641.00	12,271.5	.2152	Steam.
Third shelter for Farmers' Produce Market, B Street, between Tenth and Twelfth Streets NW.	13,632.00	274,908.4	.0495	None.
Foundry addition to McKinley Manual Training School, No. 130, Seventh Street and Rhode Island Avenue, NW.	8,248.39	41,940	.1966	Do.

[1] Without heating and ventilating. [2] Exclusive of cold storage.

THE EFFECT OF THE WAR ON PROGRESS OF BUILDINGS.

During the past year the plans for all buildings, for which appropriations have been made, were completed, with the exception of the Eastern High School and the Woodridge and Langdon School. The purchase of the site for the Eastern High School was consummated last month and the preliminary plans for the building are now in the hands of the principal for suggestions concerning the arrangement of rooms and the floor areas required for the several educational subdivisions and for recommendations as to the relationship between departments and subdivisions intended to afford the most convenience in school administration.

REDUCTION IN OFFICE FORCE.

On account of inducements of higher pay and urgency of war work, about 40 per cent of the office force has been attracted to positions with the Federal Government, either in technological branches or the military service. As the drafting force has been reduced to nearly one-half of its former size, and as properly trained and experi-

enced draftsmen are not available to refill the places vacated, the preparation of the plans for the Woodridge and Langdon School was intrusted to an architect who had designed one of our schoolhouses. But he has been delayed in the completion of the plans by inability to secure draftsmen and retain them long enough to finish the work.

HIGH COST OF BUILDINGS.

The foregoing table shows the dates when plans for our District buildings were advertised for proposals. As far back as last October, the bids for the Petworth School exceeded the appropriation about 80 per cent, and it is safe to say that the cost of such work has advanced at this time to 90 per cent over prices prevailing when the estimates were prepared. After advertising for proposals for several other buildings, it became evident that no bids could be obtained within the appropriations. The plans were completed and filed for more auspicious time for construction, or until additional funds can be obtained. Toward the end of the fiscal year the War Industries Board placed an embargo on the most important building materials and put all buildings, not directly essential to war activities, on the nonessential list and refused to issue priority orders for shipment of materials. Such action was taken in connection with the construction of the New York schools and even the Municipal Hospital in this city. Bids were opened early in June for portable school buildings to take the place temporarily of the permanent buildings which could not be erected, but as the appropriation for portable buildings did not pass until September 1, the June bids could not be accepted and therefore such buildings can not be made available until next spring. The situation is clearly expressed by the chairman of the Subcommittee on Appropriations of the House, who said:

"I am afraid that if you let the contract at this particular time you will not be able to get anything like the reasonable worth of your money, for two reasons: In the first place, your labor cost is high and your material cost is high; but the overshadowing reason is that uncertainty of building conditions would cause any contractor to put a greater leeway of profit into any bid that he might submit than he would under more normal conditions * * *. The policy should be not to undertake any new buildings this year. I do not know what policy will be agreed to."

DIFFICULTY IN OBTAINING BIDS.

In several instances, in response to advertisements, no bids have been submitted. One building has been advertised several times. Contractors have lately made the statement that the uncertainty of the wage scale, the scarcity of labor, and the inability to obtain materials even at greatly increased cost has deterred them from bidding on such work where the appropriations are limited to a specific sum based on estimates made several years ago. For several months past contractors have stated that they will not bid on any work on the fixed lump-sum contract price, and will not sign contracts containing the time limit and liquidated damage clauses. Many manufacturers of building materials and equipment have declined to bid on account of the drain in their forces by the draft and the priority of Government work. It has been extremely difficult to obtain materials such as heating and electrical apparatus and hardware even at the higher prices.

CONSTRUCTION WORK BY THIS OFFICE.

After advertisement and failure to obtain bids within the appropriations, some of the work which was deemed most necessary and urgent was undertaken by this office. By employing day labor and purchasing materials directly, this office has been able to erect several of the buildings or additions within the amount of money available. But lately, even this expedient seems likely to fail on account of the scarcity of labor and the embargo on essential building materials. Work of this kind could be done more expeditiously and consequently more economically, if the departmental regulations for purchasing of materials could be adapted to the requirements under existing conditions and so construed that those in charge of the project might prevent loss of time and loss of wages of mechanics by prompt and sequential purchase and delivery of materials.

PURCHASE OF MATERIAL FOR SPECIAL WORK AND ROUTINE WORK.

In instances like the above mentioned, where the bids for buildings exceed the appropriation and the work is undertaken by this office in place of a contractor, the same rules and regulations which apply to the purchase of annual supplies and mate-

rials should not prevail. In the spring, when estimates are made for annual supplies, such work is not contemplated and can not be included in the estimate for such annual supplies. Such special building work would ordinarily be put under contract and the building contractor would furnish both labor and materials. It can not be determined at the time the schedules of annual supplies are prepared whether such building work will be done by contract or by day labor, and in the event of the purchase of material for a schoolhouse the amount required for one building would probably exceed the entire amount scheduled for the whole fiscal year. It is not possible, when preparing items for the annual schedule, to include supplies and materials for a building in advance of the plans and specifications, and therefore the schedule articles in a majority of cases will not comply with the plans and specifications. Under such circumstances, the rules should be reasonably construed and the materials for work, which was not contemplated when the schedule of supplies was prepared, should be purchased in open market so that both the price and time of delivering could be considered.

SUGGESTED STANDARDIZATION OF BUILDINGS.

For several years, both in Federal and District work, it has been suggested that the buildings might be standardized. This, in so far as the plans and materials of the buildings, may be done to a very limited extent. About 20 years ago the District adopted a plan for an eight-room school building which was highly commended by the superintendent of schools at that time and was repeated in many buildings until we had constructed about 75 eight-room school buildings on what was called the "cart-wheel plan." About 1908, the schoolhouse commission decided that the eight-room building was uneconomical, and recommended buildings of not less than 16 rooms. Then the civic "community center" became popular and the plans went through changes to provide for such purposes. Within two or three years the location of the branch libraries in school buildings has been under consideration, and this will effect a change in plan. Recently, societies for the prevention of tuberculosis and the teachers have questioned the necessity for extensive mechanical ventilation in schools and advocated the "open-window" rooms. This would revolutionize the plans once more. The orientation, the proximity to other and taller buildings, the shape and size of the lot, and the grades and street approaches must be taken into consideration as they almost invariably require changes in the plans. Furthermore, in the fire-engine houses the same difficulties are encountered. For many years all apparatus was drawn by horses and the houses were nearly standardized for such service. Lately it has become apparent that it is more advantageous to use motor apparatus, and therefore the "standardized" houses must be restandardized. It will be found that to standardize or repeat building plans will amount to retrogression and inefficiency, and we will be charged with being "behind the times." There never was a building planned but that it might have been improved upon, and even if all surrounding conditions are alike for duplication, the architect would probably improve his first plan.

FUEL CONSERVATION AND INSPECTION OF HEATING AND VENTILATING APPARATUS.

On January 17, 1918, a circular letter was addressed to the heads of departments, by direction of the commissioners, through the purchasing officer, calling attention to "the drastic action taken by the Fuel Administrator, forbidding the use of coal in practically all industries on certain dates. I am directed by the commissioners to again say to you that each department must practice every economy possible." On the prior occasion referred to the heads of departments were directed not to open windows in severe weather and interfere with the heating and ventilation of the building and cause unnecessary consumption of fuel. Taking into account the seriousness of the fuel situation last winter and in view of prospects this winter, I believe that one of the most important matters with which this office is concerned is the heating plants and fuel consumption in the District buildings. In the school buildings alone the annual expense of the fuel has now reached $150,000 a year and the management of the plants has been a source of great concern. It has been a practice in the schools, even where modern ventilating apparatus is afforded, to open classroom windows in the severest winter weather. That there is a popular impression that such a practice is necessary is shown by the following report of the heating, ventilating, and sanitary engineer, District of Columbia:

"*Memorandum to the municipal architect, District of Columbia, re classroom ventilation.*—I have the honor to acknowledge the reference to this office of the communication to you dated March 26, 1918, and signed by the secretary of the Association for the Prevention of Tuberculosis, setting forth the belief that there is no proper substitute

for direct ventilation through open windows in public-school buildings, and transmitting extract from a paper by Dr. S. Josephine Baker, of the health department of New York.

"I confess to an embarrassment in approaching the broad subject suggested by both papers, because it must ultimately lead to the proposition, Shall the present system of heating and ventilating public schools in the District be absolutely abandoned, the large and expensive plants be removed, and an attempt be made to provide an entirely different system, with open windows for the admission of the outside air as a vital factor?

"These are war times when we are told the very life of our Nation depends upon the strictest economy even to the point of sacrifice. We have been commanded to find a substitute for the very bread we eat, and following the bitter experience of the past winter, we have been urged by the National Fuel Administration, the voice of the President of the United States, when speaking upon the subject, to practice the most rigid economy in the use of coal. The modern heating plants installed, in our later and more expensive school buildings at least, represent the best thought and scientific research in heating, ventilating, and sanitary engineering. To discard them entirely, or even to attempt to remodel them in what I believe would be a vain endeavor to meet the demands of Dr. Baker, a temperature of 68° F. in the school room, during bitter wintry weather, with open windows, would cost a vast sum of money and labor which I fear, at this time certainly, would be prohibitive.

"Constructive criticism, even in the field of engineering, is susceptible of analysis and experiment that may lead to betterment. The criticism of theory that suggests something approaching the impossible in the field of the practical is difficult to deal with. It requires neither the learning of the sanitary doctor, nor even of the mechanical engineer, to understand that, with open windows, more coal and a more intense fire is needed to neutralize the cold. This at once brings us face to face with the proposition whether we are willing to use the great increase in coal required over the consumption under the present system, and whether we can get the coal. The increased expense is obvious, without giving thought at all to the question of patriotic sacrifice and economy.

"Assuming that the coal may be procured and that the additional expense is no object, then arises the question of still further expense for the remodeling of the plants at present in use, or the installation of plants that may be better fitted to meet the conditions suggested, because the present system can not be properly operated with open windows.

"Inasmuch as our latest plants represent the best that the science of engineering has thus far been able to devise for the sanitary heating and ventilation of school rooms and large halls, and inasmuch as such plants are being used in the latest and best school structures that have been and are still being erected throughout the country, it is doubtful if authority can be readily obtained to exchange them for others. At any rate it is a question probably which Congress alone can determine.

"But before yielding to despair over this extraordinary situation, is it not wise to more closely examine Dr. S. Josephine Baker's paper to see if it accurately states facts to warrant the apprehension felt by the Association for the Prevention of Tuberculosis and particularly the conclusions reached by its secretary's statements of her experiments?

"Dr. Baker's report, Table XII–A for 1916, shows the absence of pupils due to respiratory ailments to be 10.6 per thousand for type A (open-window classrooms, natural ventilation, temperature 50° F.), 10.2 per thousand for type B (open-window classrooms, natural ventilation, temperature 68° F.), and 14.2 per thousand for type C (closed-window classrooms, mechanical ventilation, temperature 68° F. The difference between type B and type C is 4 per thousand, or four-tenths of 1 per cent, and not 32 per cent, as stated in the secretary's letter.

"Dr. Baker's report, Table XII–B, for 1916–17, shows the absence due to respiratory ailments to be 9 per thousand for type A, 10.6 per thousand for type B, and 13.1 per thousand for type C. The difference therefore between type B and type C is 2.5 per thousand, or twenty-five one-hundredths of 1 per cent, and not 32 per cent, as stated in the secretary's letter.

"Table XII–A shows the respiratory sickness of pupils in attendance at school to be 36.3 per thousand of type A, 22.7 per thousand of type B, and 76.1 per thousand of type C. The difference between type B and Type C therefore is 53.4 per thousand, or 5.34 per cent; not 98 per cent, as stated in the secretary's letter.

"Table XII–B shows respiratory sickness among pupils in attendance to be 74.8 per thousand in type A, 47.3 per thousand in type B, and 97.3 per thousand in type C. The difference between type B and type C therefore is 50 per thousand, or 5 per cent; not 98 per cent as stated.

"It will thus be seen that even from Dr. Baker's own figures the contrasts are not so striking as the Board for the Prevention of Tuberculosis in the District of Columbia erroneously supposes. Both the association and its secretary, it would appear, have been led into serious error by overlooking the fact that in each instance Dr. Baker gives the number of pupils per thousand and not the percentage of results, as the secretary's letter seems to imply. Of course, with an obvious error as the basis for the contention of the association, based on Dr. Baker's report, no argument to the contrary seems necessary.

"But, inasmuch as the secretary states that the association is rather committed to the principle of open-air ventilation of class rooms, might not that position be modified by the experience of D. C. Bliss, superintendent of schools of Montclair, N. J., in tests covering a period of two years, as set forth in an article by him in The Psychological Clinic, issue of Arpil 15, 1915, Vol. IX, No. 2, a photostatic copy of which is herewith submitted?

" 'Unfortunately for the development of educational science,' the article states, 'there is a strong tendency in the profession (meaning the educational profession) to govern practice by opinion, with little real scrutiny of facts. This attitude of mind is responsible for the establishment of many open-window classes in various school systems in the country. To many who advocate the classes, it seems a self-evident proposition that pupils working under such conditions will show increased physical gain and a more efficient mentality than those who sit in the customary well-warmed room.'

"After presenting the assumed arguments of these enthusiasts, namely, that fresh air is absolutely essential to good health, the evidence of its efficiency as a healing agent in tuberculosis, that sickly and anemic children have gained in health and made progress in their studies equal to that of pupils in the regulation classroom and that therefore normally healthy children, if placed under the same conditions, will show a still greater improvement, due to better physical status, Mr. Bliss, who admits that he was a believer in all this at the outset, notes with great detail the surprising results shown by the tests made in the Montclair schools with the expectation that the results would fully corroborate the commonly accepted opinion. 'Whatever bias existed,' the article states, 'was in favor of, rather than against, current opinion.'

" 'The school conditions in Montclair,' it is declared, 'were very favorable to such a study. It was possible to select groups for the open window and control classes from approximately the same type of children; an efficient medical department provided expert opinion on the physical condition of the children, and all mental tests were given by one person.'

"A second, a third, and a fifth grade class were selected, no two of these classes being in the same building. Each was checked by a control group of equal number in the same building. The children in the open-window classes were designated at the request of parents who were believers in the fresh-air theory and who, it is presumed, supplemented the school arrangement with favorable home conditions. So far as it could be determined superficially the classes were physically equal.

"A definite attempt was made to check all pupils in both open-window and control classes:

"1. On degree of nutrition, measured in terms of weight gained and weight lost;

"2. On general health, as indicated by the number of children absent because of illness and the total number of days lost thereby; and

"3. On mental condition, indicated by a comparative amount of fatigue in the two classes, determined by a comparison of tests, one given half an hour after school opening in the morning and a similar one to the class late in the session.

"The weight test extended from November to March. After stating in detail the results of the tests, the article declares: 'When we remember that these statistics are for four separate open-window classes, in three different school buildings and for two successive years, it is hardly conceivable that the close similarity in the records is merely a coincidence.

" 'A surprising feature of the whole experiment with the open-window classes,' states the article, 'is the attitude of the parents. Almost without exception they are convinced that their own children greatly benefited by the plan. This conviction is so positive that it is not affected in the least by the statistics of the classes.'

"In closing his paper, Mr. Bliss tersely, if conservatively, declares: 'One conclusion, however, is unavoidable, and that is the absolute necessity for basing our school policy upon well-ascertained facts rather than upon mere opinion.'

"Thus, it will be perceived, 'even doctors disagree,' and to the engineer, be he mechanical or otherwise, whose profession bases its claim to respect upon ascertained facts and experiences, the contemplation of an argument with 'opinion' which is inclined to maintain itself in spite of facts and figures is not profitable.

"However, as an engineer should be prepared to adapt his skill and knowledge to the solution of every problem presented within his line, I hold myself cheerfully at attention to receive and to the best of my ability to execute the orders of those in authority. I may be pardoned, I trust, if I renew the suggestion that criticism of the present method of heating and ventilating the school rooms of the District does not fairly lie against the splendid system installed in the larger and more expensive school buildings of Washington until that system has been first properly operated. It is not being so operated now and has not been for some time, as my previous reports and memoranda will clearly demonstrate. Proper operation of that system in its every detail is just as essential to successful results as the open window is to the fresh-air theory. Again I invite attention to my memorandum under date February 21, 1918.

"Respectfully submitted.

"T. E. LANDVOIGT,
"*Heating, Ventilating, and Sanitary Engineer, D. C.*"

For the past 8 or 10 years efforts have been made to demonstrate that in a modern building with improved apparatus the opening of the windows will not afford fresh air, but on the contrary, permits the warm fresh air supplied to the room to be wasted through the open window and robs other rooms of their proportional share of ventilation. The waste of fuel is apparent and I feel that results can only be obtained by a thorough investigation by competent authorities and by special directions following such an investigation.

Last year in two school buildings only the District invested about $200,000 in heating and ventilating apparatus, and for many years we have been investing about $150,000 a year in such apparatus, and now spend in the schools $150,000 each year in fuel. If the association advocating the open window is correct, about $100,000 a year is wasted in the installation of these ventilating plants and at least half of the expenditure for fuel. This is certainly important enough to demand serious study and emphatic report. I have had some correspondence on this subject with the specialist in school hygiene of the Bureau of Education, Interior Department. I would recommend that, by agreement of the Secretary of the Interior, the Secretary of Commerce, the Director of Public Health Service, the Fuel Administrator, and the commissioners, a commission be appointed to investigate the modern heating and ventilating plants in the public schools, as to their mechanical features, their operation, their fuel consumption, and their sanitary efficiency, and determine whether such plants are economical or necessary, or whether the open-window classroom will suffice and thereby save an investment of about $10,000,000 a year throughout the United States for such heating and ventilation.

DISTINCTION IN MANNER OF OBTAINING BIDS.

During the past year a satisfactory agreement has been made with the purchasing officer recognizing the distinction in our duties with respect to obtaining proposals. It has been agreed:

First. That where any department requests proposals for any materials, apparatus, or fixtures, to be used in the construction or repair of a building belonging to the District, and which may affect the heating, lighting, and safety of the building, the request and specification must be submitted to and approved by the municipal architect before the bids are obtained.

Second. That where and when such request for bids covers both labor and materials, the materials to be furnished by the successful bidder for both, in conjunction with the work, that such proposals will not be solicited by the purchasing officer, but will be handled by the municipal architect.

REORGANIZATION OF REPAIR SHOP.

On July 16, 1917, the commissioners modified their orders with respect to method of making public school repairs, in brief, as follows:

That the board of education submit a list of repairs not later than May 1. That the municipal architect combine this list with one from the superintendent of repairs, and from the combined list make a "schedule of repairs," separated into "necessary repairs" and "desirable repairs" or improvements. That on January 1 the engineer commissioner will forward to the board of education a list showing repairs that have been made according to "schedule" and also a list showing requests for repairs received by the municipal architect after May 1 and before December 20, the board of education to advise the commissioners, not later than February 1, as to the relative importance of the unfinished items. That about 70 per cent of the work may be done during the summer vacation of the schools.

ENGINEERING ASSISTANT PLACED IN CHARGE.

The engineer commissioner, after studying the conditions at the repair shop in 1916, expressed the opinion that the office of the municipal architect is less well equipped to handle the work assigned to it than any other office under his supervision. That as the municipal architect has charge of all construction work and also of all repair work and has to devote so much time to small details in connection with the repair work, an additional employee was necessary, to be given supervision over the repair work. Congress created the position of engineering assistant to the municipal architect, and in a later communication the engineer commissioner stated that "this official will relieve the municipal architect of the details of the repair work." Therefore, the engineering assistant to the municipal architect was put in charge of the repair shop office work and general administration thereof.

RULES FOR MANAGEMENT OF THE SHOP.

Written directions were prepared defining the duties of all employees at the repair shop and also directions covering the methods and procedure. On July 1, 1917, the assistant engineer commissioner inaugurated a new system of property accounting, to take the place of the system of stock accounts which had been in practice at the shop for about seven years. The duties of the engineering assistant pertained to the office work, preparation of schedules of repairs, computing, estimating, pay rolls, stock accounting, etc. The duties of the superintendent of repairs related to the actual work of repairs on the buildings and direct supervision over the bosses, mechanics, laborers, and teams. The duties of all other employees were defined.

NEW SYSTEM OF STOCK ACCOUNTING.

The system adopted was much more extensive and complex than the one it displaced, as it requires a separate card for each and every item or article. Also the size, location, section, unit, class, item, unit price, maximum and minimum amount, date when ordered, quantity ordered, requisition number, quantity received, quantity issued, balance in store room, total on hand, value, and cash balance. When it is realized that at such an establishment as a builder's repair shop about 4,000 items must be handled, covering every constituent of a building, including the mechanical equipment for ventilation, heating, lighting, power, plumbing, etc., and supplies necessary for the maintenance and operation of the plants and of the repair shop, some idea of the magnitude of this branch of the work can be obtained. Take the plumbing supplies alone, and with all the different sizes of pipes, ells, fittings, etc., each of which, although they may vary but one-eighth of an inch or less, must be entered separately and priced or valued accordingly, and the same for the numerous steam-fitting supplies, electrical equipment, etc. After the completion of this card system, the daily transactions in receipt and issue of stock or materials necessitated about 250 entries each day. This is aside from the system for the care and accounting of nonexpendable stock, such as tools and shop equipment.

SHOP FORCE INCREASED.

In the rules providing for the management of the shop, and in view of the increased work entailed by the new stock accounting system, several new lines of work were started; a planning clerk, to fill out work orders and arrange on a planning board for the orderly routine of work; a store clerk, to keep property accounts as prescribed by commissioners' regulations for such work; a shipping and receiving clerk, to receive and receipt for all materials and compare the same with orders and requisitions to see that the amount and quality is as required, to fill the orders for materials as they are called for by the mechanics on the work, and to see that stock does not run down below a proper amount. Besides these essential employees, the engineering assistant to the municipal architect added to the office force and increased the amount of paper or clerical work of the shop.

OVERHEAD EXPENSES.

The overhead expenses of the repair shop, for personal services, under the superintendent of repairs, in 1916, were $18,530.88, and under the engineering assistant to the municipal architect, according to his report of January 10, 1918, for 1917, were $28,782, or an annual increase in overhead, under the management of the engineering assistant, of $10,257.12. There were expended by the superintendent of repairs, in office and shop supplies and equipment, for 1916 and 1917, $632.63, and by the engineering assistant, for 1917 and 1918, $5,429.30, an increase of $4,796.67, or a total increase in annual expenses of $15,047.79.

FORCE OF MECHANICS REDUCED.

On January 22, 1918, the engineering assistant to the municipal architect issued the following order: "Because of the increase in the cost of material and labor, and the resulting decrease in funds available for repairs, it has been necessary to lay off a number of employees," and on December 8, 1918, he recommended that a request for a deficiency appropriation for repairs to police stations, of $3,000, be made; for fire engine houses, $6,000; and for public schools, $65,000. In response to this request a deficiency appropriation of $20,000 was made for the schools, it being the first and only deficiency ever asked for or obtained for any branch of work under my supervision in the past 20 years.

GREATER DEMANDS ON REPAIR FUNDS.

The extremely cold weather of last winter, the difficulty in obtaining fuel and an attempt to save fuel by banking fires over the holidays or permitting them to go out, caused damage to the plumbing and laboratory fixtures to the extent of $15,000. In some instances the boilers and heating apparatus were frozen up.

LABORATORIES AND TOILETS ON UPPER FLOORS.

In 28 school buildings the toilet fixtures in teachers' toilets on the second floors froze and burst. This caused additional expense, as in many instances not only the plumbing work was damaged but the floors and ceilings had to be repaired and repainted, and even the walls of the rooms below had to be refinished. At the Western High School all the brass waste pipes under laboratory tables had to be replaced on account of corrosion from acids. At the McKinley School the drainpipe on ceiling of the second floor and the waste pipes under laboratory tables had to be repaired. At the Armstrong School waste pipes under laboratory tables had to be repaired. But prior to last winter leaks from these pipes caused the plastering in the rooms below to fall and considerable damage was done before the plastering was removed and replaced by a specially prepared plaster. No injury to the pupils was reported. At the Eastern High School the laboratory pipes froze and burst, with the resultant damage below. At the old Central High School several years ago an asphalt, waterproof floor was put in the laboratory and drainpipes carried through the outer walls after the ceilings of classrooms below the laboratory were damaged several times as the result of bursted pipes or overflowing sinks in the laboratory. Our experience with these upper floor laboratories and teachers' toilets, without ample means of heating, even during the holidays, shows the danger and expense which usually attend them, and I have therefore recommended that such rooms be located on the lower floors. This, however, will not prevent the corrosion of the waste pipes by acid in laboratories and the inevitable trouble and expense of leaky pipes and falling plaster.

DRINKING FOUNTAINS.

About 16 years ago the health department decried the common drinking cup in the schools as a source of danger, and after consultation with the inspector of plumbing, recommended the "bubbling fountain," or "sanitary drinking fountain," and on this recommendation the commissioners obtained an appropriation for schools for "the installation of sanitary drinking fountains in buildings not supplied with the same," and since then about 600 so-called sanitary fountains have been installed. It is now decided by the health department that these fountains are little or no better than the common drinking cup, and within the past year the superintendent of repairs, the superintendent of the water department, and the inspector of plumbing have vainly sought for a drinking fountain which will meet the requirements. About 25 different types have been tested without success, and now one devised by or under the supervision of the health department is being made for a practical test. The changes in these fountains will be a severe drain on the repair funds.

INCREASE IN MECHANICS' AND LABORERS' WAGES.

During the past year the wage board, composed of the heads of the several divisions of the engineer department, have had under consideration the successive and almost continuous application for increase in wages of mechanics and laborers employed in engineering and construction work by the District. Notwithstanding the fact that at the District of Columbia repair shop practically all mechanics and laborers are employed and paid by special limited appropriations which not only fix the amount expendable but also determine the extent of the work, an effort has been made to meet the general increase in wages allowed by the Federal Government for similar

work. At the same time endeavors were made to show the employees the advantages of the steadier and more continuous employment afforded by the repair shop over the outside employment and the advancement by promotions for meritorious service, and also the increased compensation allowed and the provisions of holiday pay. It is regrettable that the law providing for compensation of workmen injured in the service of the Government does not apply to the District workmen. I would recommend that the corporation counsel be requested to draft a bill or amendment to cover District service. With this exception, I believe the men at the repair shop have decided advantages over the journeymen on the outside. It has been shown that the average wage of laborers and mechanics at the shop have nearly doubled since 1913, and the increase in the past year has been about 39 per cent. These conditions and advantages were impressed upon the men and every effort made to preserve contentment at the shop, but the men developed the belief that they should have higher wages than mechanics on the outside. As a result, the force became discontented and finally aggressive in their demands and the office force threatened to resign unless their demands were immediately acceded to A change of administration of the shop resulted. Since this change the force has been reorganized and I have heard no more complaints.

Public schools, District of Columbia, 1918, repairs to buildings.

Appropriation	$150,000.00
Deficiency appropriation	20,000.00
10 per cent on outside orders for superintendency	2,306.68
Running stock on hand June 30, 1917	24,515.67
	196,822.35
Total amount of labor accounted for on written orders	76,275.37
Total amount of material accounted for on written orders	38,449.12
Total amount of contracts and shop orders	32,851.33
Gas consumed (pro rata share)	40.60
Electric current consumed (pro rata share)	57.24
Purchase of ice (pro rata share)	16.86
Allotment to crane	211.51
Allotment to cement warehouse	126.51
Rent of 7 party line switchboard	18.81
Allotment to municipal garage	180.00
Purchase of linoleum for office floor	180.00
Purchase of forage	3,948.84
Allotment for car tickets	300.00
Purchase of coal	476.40
Purchase of woodworking machine	199.86
Purchase of adjustable dado head for woodworking machine	11.20
Purchase of scales for use in shop	36.65
Purchase of 8-foot shears for foot power	258.00
Purchase of elevating truck	82.00
Purchase of blank forms for use in Shoupalinger manifolding machines	80.00
Purchase of and placing rubber tires on vehicles	16.16
Purchase of typewriter chair and stool	8.40
Purchase of duplicating machine	85.00
Purchase of paint mixer	250.00
Purchase of index tags, type, signals, drawing ink, two imperial panels with SOS card holders, wings and stand for same, SOS units, blank guides, envelopes, rubber stamps, paper towels, machine for automatic numbering, celluloid, journals, index cards and postal scale, for use in office	448.71
Fractional differences in prices on material, caused by issuing small quantities, and the difference in prices of District of Columbia contract schedule for the fiscal year 1917–18	5,525.86
Running stock on hand June 30, 1918	33,979.66
Unexpended [1]	2,708.26
	196,822.35

[1] This large unexpended balance is due to the fact that the commissioners canceled several contracts which the contractors refused to enter into, owing to their not having received the Commissioners' orders awarding same, and material and labor having advanced to such an extent that they could not do the work for the amount of their bids.

Fire department, District of Columbia, 1918, repairs to engine houses.

Total amount of labor accounted for on written orders	$8,341.27
Total amount of material accounted for on written orders	4,392.56
Total amount of contracts and shop orders	30.03
Purchase of forage	468.49
Electric current consumed (pro rata share)	6.78
Purchase of ice (pro rata share)	1.04
Gas consumed (pro rata share)	5.74
Allotment to crane	30.77
Credited school stock	602.20
Unexpended	121.12
Appropriation	14,000.00

Metropolitan police, District of Columbia, 1918, repairs to stations.

Total amount of labor accounted for on written orders	$3,681.89
Total amount of material accounted for on written orders	2,183.31
Total amount of contracts and shop orders	439.16
Purchase of forage	468.49
Gas consumed (pro rata share)	9.10
Purchase of ice (pro rata share)	.96
Allotment to crane	13.96
Allotment to cement warehouse	5.75
Credited school stock	118.35
Unexpended	79.03
Appropriation	7,000.00

Courts, District of Columbia, 1918, Police Court, repairs to building.

Appropriation	$1,500.00
Expended	1,485.01
Unexpended	14.99

Report of inspection of steam boilers, public schools, 1918.

School.	Number of boilers.	High pressure.	Low pressure.	Tested.	Safety blows.	Date of inspection.	Remarks.
Armstrong Manual Training	4	2	.....	180	115	July 10, 1917	Repaired fire box sides and new gaskets.
Do	.....	2	.....	160	115	.....do.....	
Birney	2	.....	2	60	25	July 18, 1917	Repaired fire box, new gaskets and new valve on water column.
S. J. Bowen	1	.....	1	75	40	July 21, 1917	Repaired fire box sides and new gaskets.
Brightwood	1	.....	1	60	20	July 27, 1917	Repaired fire box sides and steam gauges.
Brookland	2	.....	1	80	50	July 25, 1917	Repaired fire box sides and new gaskets.
Do	.....	.....	1	60	25	.....do.....	Do.
Business High	3	3	.....	120	80	July 17, 1917	Do.
Old Central High	4	.....	1	40	.....	July 6, 1917	Repaired fire box sides, new gaskets, etc.
Do	.....	.....	3	50	25	.....do.....	
Congress Heights	2	.....	2	65	30	July 18, 1917	Repaired brick work and new gaskets.
Cranch	2	.....	1	50	30	June 30, 1917	Tubes renewed, new gaskets, and repaired fire box sides.
Do	.....	.....	1	60	28	.....do.....	
Curtis	2	.....	1	60	30	June 26, 1917	Repaired fire box sides and new gaskets.
Do	.....	.....	1	60	28	.....do.....	
Dennison	2	.....	2	50	20	July 6, 1917	Do.
Dunbar High	3	3	.....	180	110	July 12, 1917	New gaskets and other minor reparis.
Eastern High	2	.....	2	100	30	July 2, 1917	Repaired fire box sides and new gaskets.
Emery	2	.....	2	60	25	July 9, 1917	Repaired steam gauges, fire box sides and new gaskets.
Force	2	.....	2	30	15	June 26, 1917	Repaired fire box sides, new gaskets, and new grate bars.
Franklin	2	.....	2	75	35	July 17, 1917	Repaired fire box sides and new gaskets.
Gales	2	.....	2	60	25	July 28, 1917	Repaired fire box sides, new gaskets. and patched boiler.
Garnet	2	.....	2	50	25	July 9, 1917	Repaired fire box sides, new gaskets and steam pipe (boiler conneation).
Grant	2	.....	2	60	25	June 27, 1917	Repaired fire box sides.
Henry	2	.....	2	50	20	July 5, 1917	Repaired fire box sides and new gaskets.
Jefferson	2	.....	2	60	30	July 20, 1917	Repaired fire box sides, new gaskets, and blow cocks.
Lincoln	2	.....	2	60	20	July 3, 1917	Repaired fire box sides and new gaskets.
M Street heating plant.	2	2	.....	150	100	July 31, 1917	Repaired steam gauges, new gaskets and fire box sides.
McKinley Manual Training.	6	6	.....	180	115	July 14, 1917	Repaired fire box sides and new gaskets.
Do	(1)	.....	.....	150	100	Sept. 4, 1917	
Miner Normal	2	2	.....	150	100	July 24, 1917	New gaskets, repaired fire box sides and other minor repairs.
Park View	2	.....	2	80	40	July 25, 1917	New gaskets.
Peabody	2	.....	2	50	20	July 2, 1917	One boiler retubed, fire box sides repaired, new gaskets and new grate bars.
Powell	2	.....	2	60	25	July 26, 1917	New gaskets and other minor repairs.
Seaton	2	.....	2	60	30	July 3, 1917	Repaired fire box sides and new gaskets.
Stevens	2	.....	2	60	25	June 26, 1917	New gaskets.
Sumner	2	.....	2	70	30	July 27, 1917	Repaired fire box sides, new gaskets and new metal stack.
Syphax	1	.....	1	75	40	July 21, 1917	Repaired fire box sides, new gaskets and changes in steam line.
Tenley	1	.....	1	60	35	Aug. 7, 1917	Repaired fire box sides, blow line and new gaskets.
Wallach	2	.....	2	60	25	June 30, 1917	New gaskets.
Webster	2	.....	2	60	25	July 17, 1917	Do.
Western High	4	.....	4	30	8	July 19, 1917	Repaired fire box sides, new gaskets, one boiler retubed and other minor repairs.
Wilson Normal	2	2	.....	150	115	July 24, 1917	Repaired fire box sides, one new set of grates, new gaskets, etc.

[1] 1 upright boiler.

WORKHOUSE AND REFORMATORY.

During the past year the engineering and construction work at Occoquan and Lorton has been conducted under unusual difficulties. It was supposed that the passage of the prohibition law for the District would result in greatly reducing the number of inmates available for work on the buildings and the other productive industries of the institutions. For a short time after the enactment of the law the results were as expected and the work was retarded. But the effects of the prohibition law, in the reduction of commitments, lasted but a short time and then had the opposite effect. Formerly, we could count on a few men from the building trades among the prisoners who could be used in the work, and with very few hired mechanics the work progressed at a fair rate. But the most potent cause for the scarcity of the mechanics committed during the past year is the great advance in wages and inducements to remain at work in the city and the camps. After the work was started at Camp Humphreys, a few miles away, it has been almost impossible to obtain skilled labor for the workhouse and reformatory, and consequently work that should have been completed in six months has taken over a year.

COST OF WORK.

Attention is invited to the report of the constructing engineer, showing the cost of the several buildings and other work undertaken during the year, and incidentally the great increase in the cost of maintenance. Attention is especially invited to that part of the report dealing with the bookkeeping methods which do not afford reliable means of separating the expenditures so that the proper work may be charged. The books are kept by the clerk, under direction of the superintendent of the workhouse, and the constructing engineer can not segregate the charges in a way to arrive at an accurate statement of the cost of the several pieces of work. I am also informed that in the matter of requisitions for building materials issued on the storekeeper, or "commissary," at the workhouse, no job number or symbol is uniformly used to indicate which building or piece or work the material will be used upon and charged to, and that requisitions are honored which are not drawn by the constructing engineer and that certain charges are made against the appropriations for construction and repairs which should not be made without the knowledge and approval of the constructing engineer. As the municipal architect has been put in charge of the engineering and construction work, I took up this question with the auditor last year, but as no improvements have been made, I will submit a special report, with recommendations for a system by which the accurate cost of work can be ascertained.

IMPROVEMENT IN THE BUILDINGS.

I have taken up with the auditor, who was acting superintendent of the workhouse and reformatory, and with the new superintendent, certain changes which seem desirable in the buildings to prevent the escape of prisoners which has become so frequent, expecially from the reformatory.

The frame buildings which were constructed under my supervision in 1907 and 1908 were intended as temporary structures, and while they served a good purpose at the workhouse for short-term men, they are inadequate and poorly adapted for long-term men and advanced criminals. Furthermore, the large dormitory system has, in my opinion, serious disadvantages for such prisoners. I would recommend that the present frame buildings at the workhouse be incased in brick walls as soon as possible, thereby permitting the use of the present structures until the more permanent and comfortable buildings are completed. I have also requested the auditor and superintendent to arrange for a meeting of the penal commission for discussion of the proper type of buildings for the reformatory which will accord with the ideas of the commission concerning the "open-air" management of prisoners and the advanced theory of reform by allowing greater liberty and freedom of movement than ordinarily accorded such men, and at the same time reduce the chances of escape which have been so frequently tsken advantage of. According toreports, at least 10 per cent escape from this institution, and one person has escaped three times.

WASTE OF FUEL.

The present frame buildings at the workhouse have been erected about 10 years, and as the lumber was cut on the reservation and green when used, the present condition can be imagined. Last winter it was almost impossible to heat these buildings, and over 4,000 tons of coal were consumed. Therefore, I have suggested that they be replaced by brick structures.

The following is the constructing engineer's report for the year ending June 30, 1918, for the workhouse and reformatory of the District of Columbia, at Lorton, Va.:

This year has experienced a decided decrease in the number of prisoners at the workhouse and the decrease in the number of mechanics among the prisoners has been much greater than that of common laborers. For a part of the time there have been no mechanics, such as carpenters, bricklayers, plumbers, and painters, and hardly ever have we had more than one or two inmates who were mechanics. This condition has made it necessary to depend almost entirely upon hired mechanics to do repair and construction work. Since the United States entered the war our hands have been practically tied up as far as new construction is concerned, due to the great difficulty experienced in hiring mechanics, especially carpenters, and in securing necessary material, notably lumber of the larger dimensions. Under these conditions, a large percentage of the work contemplated at the beginning of the year had to be put off and some of the work started has not been finished as otherwise would have been done.

As was done last year, the cost of each job is reported under three heads: First, the cost of all material, and paid force account, which has been chargeable directly against the appropriations for construction; second, the cost of brick, sand, and crushed stone, using the actual cost, the computation of which is explained in another paragraph and the cost of the lumber sawed on the reservation, taking the price set by the superintendent, Mr. Charles C. Foster, namely, $10,000 for the workhouse lumber and $12,000 for that sawed at the reformatory; and, third, the cost of prison labor, using the average per capita cost per day as computed from the figures given by the chief clerks of the two institutions, namely, $1.319 as the cost per prisoner per day at the workhouse and $2.224 at the reformatory. The cost of lumber is not computed as was that of sand, stone, and brick, because while the supplies of the brick clay, sand, and stone in their natural beds are practically inexhaustable and therefore of very low value in their natural state, the supply of standing timber is not inexhaustable and has considerable value.

To the cost of all material produced by the institutions must be added the cost of hauling. Data necessary to compute the cost of hauling furnished by Mr. Pugh, the officer in charge of the stable, as follows:

Cost per team of feed, stable, care, and upkeep of team and wagon, $2.50 per day. The average value of a team (horses and mules) is about $300. Average life of a team (many are in bad condition when they arrive here) is eight years. The average value of a wagon is $120, and will last about five years. It is possible to haul three loads to the reformatory from the wharf and six loads to the top of the hill at the workhouse from the wharf.

COST OF HAUL.

Feed, upkeep, etc., per team per day	$2.500
Interest on $300, at 6 per cent (307 days per year)	.050
Depreciation on team, 12.5 per cent of $300 (307 days per year)	.122
Depreciation on wagon, 20 per cent of $120 (307 days per year)	.078
Interest on $120, at 6 per cent (307 days per year)	.023
Cost of driver per day at workhouse	1.319
Cost of driver and team per day at the workhouse	4.100
Cost of hauling 1 load from wharf to top of hill at workhouse	.683
Cost of driver per day at reformatory	2.224
Cost of driver and team per day at reformatory	5.005
Cost of hauling 1 load from wharf to reformatory	1.668

The actual cost of brick, sand, and stone to the institution was computed in the following manner:

THE ACTUAL COST OF BRICK PER 1,000.

As there were no bricks manufactured during 1917–18, those used being some held over from 1916–17, the cost was that of 1916–17, which was computed as follows:

Coal consumed per 1,000 bricks, 1,506 pounds, at $0.001542	$2.322
Labor, 3 days per 1,000 bricks, at $0.578	1.761
Oil, waste, and repairs per 1,000 bricks	.100
Depreciation, at 5.56 per cent of $24,000 per 2,400,000	.556
Interest on investment of $24,000, at 6 per cent for 2,400,000	.00
Total	5.339

The data for computing the cost of sand were given me by Mr. John Selecman, engineer in charge of machinery, as follows:

Paid labor per 125 cubic yards	$13.80
Prison labor per 125 cubic yards	2.638
Coal per 125 cubic yards	6.00
Oil, waste, and repairs per 125 cubic yards	.75
Actual cost of the dredge (second-hand machinery)	1,200.00

Life of the dredge will be about 25 years.

COST OF SAND PER CUBIC YARD.

Paid force	$0.110
Prison labor	.021
Coal	.048
Oil, waste, and repairs	.006
Interest, at 6 per cent, on $1,200 invested	.060
Depreciation, at 4 per cent, of $1,200 annually	.040
Total cost of sand, at the wharf, per cubic yard	.285

1,200 cubic yards were dredged during the year 1917–18.

COST OF STONE PER CUBIC YARD.

As the stone crusher was taken over by the Army on April 1, the depreciation and interest on the investment is charged against our stone for only three quarters of the year. The data for computing the cost of crushed stone was given by the foreman of the quarries, and is as follows:

34 days of prison labor to produce 100 cubic yards of crushed stone.
Paid labor, $3.50 per 100 cubic yards.
1¼ tons of coal, at $3.19 per 100 cubic yards.
Average, $1,041 for oil, waste, and repairs for 7,572 cubic yards.
$5,300 is the actual cost of the crusher, cars, track, and drills.
The probable life of the plant, although second hand, is 15 years, as we use it.

To this data has been added $0.15 per cubic yard for dynamite and, according to the superintendent's report, 799 cubic yards of stone were crushed in the year 1917–18. This is a very small quantity, and makes the depreciation and interest very high per cubic yard.

Cost per cubic yard:	
34 days prison labor, at $1.319 per 100 cubic yards	$0.448
Paid labor	.035
1¼ tons of coal, at $3.19 per 100 cubic yards	.040
Average oil, waste, and repairs	.138
Dynamite	.150
Depreciation, 6.67 per cent, of $3,300 for 9 months (799 cubic yards crushed)	.207
Interest, 6 per cent, of $3,300 for 9 months (799 cubic yards crushed)	.186
Total cost per cubic yard of crushed stone at crusher	1.204

At the beginning of the year 1917–18 it was understood that the system of bookkeeping for the division of construction and repair at the District of Columbia workhouse and reformatory was to be revised, so that an accurate account of all material drawn should be charged against each job upon which it was used, and in this way a close check upon the appropriation for each job of construction and repair could be kept. However, this change in the bookkeeping was not made, but the record of material for this was simply charged as before, to the heading "Construction," with no attempt whatever in separating it against the different jobs. Each time material is drawn from the commissary, the job where the material is to be used is supposed to be stated on the requisition, but this is not always done, especially in the case of the electrical, plumbing, and painting materials, and this is the only record made which can be used to divide the costs of materials used against the respective jobs. As a result, a great deal of work is required to go over these requisitions to separate the material for the different parts of the work, and even then the result can not be absolutely accurate. So I now recommend that a clerk be ap-

pointed to work in the commissary, to look after material bought for construction and repairs, and to see that each item is charged against its specific job and a balance for each project be at all times at hand, so that one project can not overdraw and rob material bought for another. In this way also an accurate cost of each piece of work can be readily obtained at all times.

Following is a report of the costs of construction and repairs which have been worked out under the difficulties enumerated above, and which I, therefore, can not say is absolutely accurate.

Construction and Repair Work.

REST HALL, OFFICERS' QUARTERS, AND HOSPITAL.

Bought material and hired force	$8,826.68
Material manufactured	860.03
Prison labor and hauling	2,304.83
Total	11,991.54

MAIN BUILDING AND BAKERY.

Bought material and hired force	$3,247.28
Material manufactured	269.41
Prison labor and hauling	1,379.48
Total	4,896.17
Reported last year	16,636.59
Total for main building, kitchen, and bakery	21,532.76
Chargeable to appropriation last year	12,518.41
Chargeable to appropriation this year	3,247.28
Total	15,765.69

PUNISHMENT CELLS.

Bought material and hired force	$1,324.64
Material manufactured	834.21
Prison labor and hauling	1,615.51
Total	3,774.36

REPAIRS TO TOTTEN HOUSE.

Bought material and hired force	$516.43
Material manufactured	15.71
Prison labor and general hauling	219.62
Total	752.76

BOILER HOUSE.

Bought material and hired force	$326.14
Material manufactured	120.62
Prison labor	111.20
Total	557.96
Reported last year	942.03
Total cost	1,499.99

CONSTRUCTION OF OFFICER'S RESIDENCE NO. 1 (NOT COMPLETED).

Bought material and hired force	$164.29
Material manufactured	166.28
Prison labor and hauling	632.75
Total to July 1, 1918	963.32

CHANGES IN SUPERINTENDENT'S RESIDENCE (NOT COMPLETED).

Bought material and hired force	$142.12
No manufactured material used.	
Prison labor	233.46
Total to July 1, 1918	375.58

POWER LINE TO AND OUTSIDE LIGHTS AT D. C. R.

Bought material and hired force	$254.76
No manufactures material used.	
Prison labor	160.13
Total	414.89

COTTAGES FOR TUBERCULAR PATIENTS.

Bought material and hired force	217.53
Manufactured material	54.00
Prison labor	160.12
Total	431.65

SEWER LINES.

Bought material and hired force	247.20
Manufactured material	42.08
Prison labor	1,063.07
Total	1,352.35

WAGON SHED AND STABLES.

Bought material and hired force	38.68
Manufactured material	8.67
Prison labor and hauling	56.15
Total	103.50

MISCELLANEOUS REPAIRS AND UPKEEP.

Bought material and hired force	212.20
Manufactured material	62.61
Prison labor and hauling	111.20
Total	386.01

GENERAL PAINTING.

Bought material	126.09
No manufactured material	
Prison labor	449.25
Total	575.34

GENERAL BLACKSMITH WORK.

Bought material	386.00
Prison labor	462.59
Total	848.59

GENERAL PLUMBING.

Bought material	78.73
Prison labor	1,779.93
Total	1,857.93

GENERAL WORK IN CARPENTER SHOP.

Bought material	$93.11
Prison labor	696.11
Total	789.22

SAWMILLS.

Bought material	119.21

EXPENSES OF CONSTRUCTING ENGINEER'S OFFICE.

Bought material	654.15

RUSTIC HOUSES.

Bought material	19.11
Prison labor	200.16
Total	219.27

REPAIRS TO HOUSE BOAT AND NINTH STREET WHARF.

Bought material	68.93

REPAIRS TO ICE PLANT.

Bought material	78.62

REPAIRS TO PUMPING STATION.

Bought material	722.69

REPAIRS TO WAGON ROADS.

Bought material	3.67
Manufactured material	7.69
Prison labor and hauling	511.58
Total	522.94

WORK ON RAILROAD CULVERT IN STONE QUARRY.

Bought material	53.77
Manufactured material	212.56
Total	266.33

WORK ON RAILROAD RIGHT OF WAY.

Bought material	643.88
Manufactured material	4.38
Prison labor	2,762.21
Total	3,410.47

CHANGING GRADE TO IMPROVE ROAD TO TOTTEN HOUSE.

Prison labor and hauling	917.49

DRAFTING WORK FOE THE REFORMATORY.

Total	506.09

COLD STORAGE IN THE COMMISSARY.

Bought material, and hired force	552.42
Manufactured material	10.50
Prison labor	175.43
Total	738.35

ENLARGEMENT OF CENTRAL POWER PLANT.

Bought material and hired force	$3,618.24
Manufactured material	1,618.79
Prison labor and hauling	3,142.60
Total	8,379.63
Total of appropriations	63,000.00
Total chargeable to appropriations	33,999.83
Unexpended	29,000.17

S. ASHFORD,
Municipal Architect.

ASSISTANT TO THE ENGINEER COMMISSIONER.

REPORT OF THE INSPECTOR OF BUILDINGS.

WASHINGTON, *July 31, 1918.*

SIR: I submit herewith annual report covering the transactions of the building division during the fiscal year ended June 30, 1918.

No report of Federal Government operations has been received during the year.

Statement of permits issued from July 1, 1917, to June 30, 1918.

	Number.	Value.		Number.	Value.
Brick:			Concrete:		
Repairs	1,045	$1,360,387	Warehouses	2	$86,000
Dwellings	381	1,651,950	Garages	9	4,850
Apartments	9	1,505,000	Metal:		
Stores and dwellings	3	21,500	Garages	414	69,540
Stores	12	185,220	Sheds	30	11,070
Office buildings	7	2,514,500	Frame:		
Monastery	1	75,000	Sheds	211	48,893
College building	1	42,000	Repairs	248	81,660
Schools	2	120,000	Dwellings	142	520,400
Hospital	1	21,000	Church	1	4,500
Power houses	3	87,500	Greenhouse	1	5,000
Bowling alley	1	6,000	Garages	129	25,980
Warehouses	5	50,300	Stables	3	3,900
Theaters	3	750,000	Elevators	82	251,845
Hall (Odd Fellows)	1	210,000	Motors	415	107,585
Garages	324	254,725	Boilers	33	14,410
Sheds	11	4,163			
Stables	3	7,150	Total	3,567	10,154,987
Chicken house	1	1,700	Awnings	54	4,050
Hollow tile:			Signs	542	5,420
Dwellings	6	38,500			
Garages	23	12,755	Grand total	4,163	10,164,457

The following summary shows the distribution of improvements in the respective sections of the District and the values of same:

	Buildings.	Repairs, etc.
Northeast	$129,835	$111,615
Southeast	150,950	45,380
Northwest	4,498,665	1,344,070
Southwest	4,100	29,025
County	3,396,165	445,182
Total	8,179,715	1,975,272
	1,975,272	.....
Sum total [1]	10,154,987	.....

[1] Does not include awnings or signs, the values of which are estimated.

Grand total for all building operations, $10,164,457.

Comparative statement for years 1917 and 1918.

	New buildings.	Repairs, etc.	Dwellings.	Apartments.	Business buildings.
1918	957	2,610	529	9	419
1917	1,436	3,226	821	44	571
	[1] 479	[1] 616	[1] 292	[1] 35	[1] 152

[1] Decrease.

Valuation of building operations, including awnings and signs:	
1918	$10,164,457
1917	15,613,075
Decrease	5,448,618
Permits issued, number of, including awnings and signs:	
1918	3,906
1917	5,582
Decrease	1,676
Projections beyond the building line, number for which permits issued:	
1918	1,102
1917	1,583
Decrease	481

Estimated number of buildings in the District of Columbia.

	Brick.	Frame.
1918, erected	813	144
1918, razed	60	47
	753	97
1917	64,648	26,709
Total estimated number standing	65,401	26,806

As will be noted there was a marked decrease in building operations during the past year. The depression is, of course, accounted for by the war. Under the conditions existing, namely, the scarcity of labor, and its high cost when procurable, the great advance in the price of materials and the difficulty in delivery, etc., combine to form such a deterrent factor in building construction that the estimated total value of $10,164,437 for the fiscal year 1918 constitutes a very creditable showing.

The receipts of building fees fell off in a corresponding ratio with the comparative inactivity in operations, the consequence being that there was an approximate difference between receipts and expenses of $10,000 for the year. A not inconsiderable amount of this sum, however, was lost to the division because of the decision of the court against the legality of the fees charged for inspections of elevators, theaters, etc. In this connection, it may be added, there have occurred several vacancies in the division during the year which have remained unfilled in the interest of economical administration. These positions, however, it will be necessary to fill as soon as conditions return to the normal.

MORRIS HACKER,
Inspector of Buildings.

Col. J. J. LOVING, U. S. A.,
Assistant to the Engineer Commissioner, District of Columbia.

Report of Inspector of Steam Boilers.

Washington, D. C., *July 31, 1918.*

Sir: I have the honor to submit through Mr. Morris Hacker, inspector of buildings, the following report for the fiscal year ending June 30, 1918, together with fees received and expenses incurred:

Number of boilers inspected	453
Number of boilers inspected for District of Columbia	27
Number of boilers condemned	3
Cases of scale and deposit	105
Cases of defective settings	8
Cases of defective safety valves	3
Cases of defective steam guages	11
Cases of defective tubes	28
Cases of defective shell plates	8
Total amount received	$2,265
Total amount expended	330
Balance	1,935

Very respectfully,

E. F. Vermillion,
Inspector of Steam Boilers, District of Columbia.

Report of the Board of Examiners of Steam Engineers.

Washington, D. C., *August 16, 1918.*

Sir: The board of examiners of steam engineers have the honor to submit to you the report for the year ending June 30, 1918.

The following table shows the work as it progressed during each month:

	Meetings held.	Applicants received.	Applicants approved.	Applicants incompetent.	First class.	Second class.	Third class.	Special class.	Duplicate.
1917.									
July	4	7	1	6				1	
August	5	13	2	11			2		
September	4	15	6	9			5	1	
October	4	7	5	2	1		4		
November	5	12	3	9			2	1	
December	5	5		5					
1918.									
January	4	10	4	6			3		1
February	4	8	3	5			2	1	
March	5	16	5	11			5		
April	5	15	8	7			5	3	
May	5	20	6	14			4	2	
June	5	6	1	5			1		
Total	55	134	44	90	1		33	9	1

In addition to examining applicants for steam engineers license the board has also conducted the examination of applicants for automobile and motorcycle operators, a full report of which is being submitted by the secretary of the automobile board.

Respectfully,

E. F. Vermillion,
H. Boesch,
W. I. Evans,
Board of Examiners Steam Engineers.

Inspector of Buildings.

Report of the Inspector of Plumbing.

Washington, D. C., *October 7, 1918.*

Sir: I have the honor to submit the thirty-sixth annual report of the work performed by the division of plumbing inspection for the fiscal year ended June 30, 1918. The following table shows the work performed by the outside force of assistant inspectors:

Preliminary inspections	7,399
Cast-iron sewers:	
New	2,663
Repairs	924
Terra-cotta sewers:	
New	84
Repairs	472
Main sewers tapped	695
Rough work in—	
New houses	1,679
Old houses	1,649
Water services	671
Notices served	113
Peppermint tests and final inspections	1,621
Work not ready for inspection when ordered	345
Changes ordered in work incorrectly installed	127
Special inspections of municipal work	25
Gas	1,201
Complaints	6,127
Total	25,995

The following are to be added to the above: Inspections made by the head of the office of a general nature, 2,011; special inspections on construction work for the District, 413; the principal assistant inspector of plumbing, examination of materials, visits to the houses of witnesses, and general police work which does not appear elsewhere, 1,219. The total of these latter inspections should be added to the above total, which gives a general total of 29,638.

The following table shows the total inspections made each year since the fiscal year 1895:

1895–6	8,677	1907–8	29,547
1896–7	14,112	1908–9	39,404
1897–8	17,550	1909–10	44,953
1898–9	17,600	1910–11	46,035
1899–1900	17,405	1911–12	45,875
1900–1	19,965	1912–13	41,644
1901–2	32,621	1913–14	37,177
1902–3	25,297	1914–15	37,478
1903–4	25,637	1915–16	35,742
1904–5	27,337	1916–17	35,189
1905–6	30,185	1917–18	29,638
1906–7	32,190		

The total estimated cost of new plumbing work installed during the year was $755,215, and the estimate of the value of repairs and remodeling work is $301,415.

The total number of inspections made by the outdoor force, 25,995, divided by the total number of days in the field, gives an average of 8¼ inspections per day per man. The greatest number of inspections made by any man in one day was 35.

Police court cases.

The total number of warrants obtained was 16, divided as follows:

Violations of the plumbing regulations	10
Work done by unlicensed plumbers	6
Total	16

These cases were disposed of as follows:

Nolle-prossed in compliance with commissioners' order	9
Fined	3
Personal bonds	2
Dismissed	2
Total	16
Amount collected from fines	$20
Preliminary inspections	437

OFFICE WORK.

The following table shows the amount of office work performed during the past year and a comparison with that of the preceding five years:

	1913	1914	1915	1916	1917	1918
Official letters	1,915	1,138	877	845	978	604
Unofficial letters	4,138	3,679	3,957	3,642	3,563	2,744
Indorsements	2,118	1,177	1,180	1,300	1,092	692
Inspectors' reports	9,015	10,262	9,715	9,440	9,345	7,754
Indexes	1,683	1,771	1,332	1,400	1,579	2,238
Plans prepared	26	18	30	24	27	17
Specifications prepared	34	50	66	55	63	15
Plans and specifications revised	1	4	1	3	2	6
Examination of plans for new building	1,857	1,518	1,486	1,361	1,567	734
Examination of repair application	3,138	2,628	3,347	2,955	2,761	2,604

Postage stamps used: 2-cent, 2,452; 1-cent, 896; postal cards, 92. Car tickets used: 1,000.

REGULATIONS.

Eight charges were made during the year in the regulations, all of which were brought about in order to simplify the plumbing code of the District.

COMPULSORY DRAINAGE.

Twenty-four cases were recommended during the last year for compulsory sewer and water connections by the health department and other branches of the District government. Notices were served in each of these cases. Nine of these notices were complied with by owners or agents, on 9 of the cases the work was done by the District of Columbia and assessment made and there are 19 cases pending. In five of these further action is suspended as the buildings are not now occupied.

PLUMBING BOARD.

There were 34 regular meetings held for the examination and rating of candidates for master plumbers and gasfitters during the last year. The total number examined was 17. The number of original candidates examined for licensing as master plumbers and gasfitters was four, of whom none passed. Of the 13 who had been previously examined for licensing as master plumbers and gasfitters (3 of whom have taken the examination twice within the past fiscal year) 1 passed and 12 failed.

Examinations of candidates appearing before the board one or more times resulted as follows:

Examination.	Passed.	Failed.	Examination.	Passed.	Failed.
First		4	Fifth	1	
Second		3	Seventh		1
Third		1	Eighth		1
Fourth		1			

PUBLIC-CONVENIENCE STATIONS.

Four public-convenience stations were in operation during the year, open from 6 a. m. until midnight, in two shifts of attendants, each working nine hours per day. The station at Seventh Street and Pennsylvania Avenue accommodated 5,168,162, the one at Thirteenth-and-a-half Street and Pennsylvania Avenue, 863,493, Ninth and K Streets, 1,111,960; and Fifteenth Street and Maryland Avenue, 785,897 patrons during the year, making a total of 7,929,512. The female patronage was about 18 per cent of the total and they contributed about 15 per cent of the cash receipts. These receipts, $5,722.96, were for the use of pay compartments, the furnishing of clean towels, shoeshine concessions, etc.

The recommendations for new public-convenience stations at Fifteenth Street and New York Avenue, in Georgetown, near Peace Monument, near Seventh Street and Florida Avenue, near the steamboat wharves, near Eighth Street and Pennsylvania Avenue SE., near Fourteenth and U Streets, near Fourteenth Street and Park Road, on Seventh Street NW. in the vininity of O and P Streets, and other similar locations are renewed for this year owing to the great increase of the population and the closing of the saloons in this city.

Very respectfully,

M. J. FENNELL,
Inspector of Plumbing.

The INSPECTOR OF BUILDINGS.

REPORT OF THE ELECTRICAL ENGINEER.

WASHINGTON, *October 10, 1918.*

SIR: I have the honor to submit the following report of the operations of the electrical department for the fiscal year ended June 30, 1918

WARREN B. HADLEY,
Electrical Engineer.

ASSISTANT TO THE ENGINEER COMMISSIONER.

STREET LIGHTING.

The street-lighting system has been maintained and imperative demands for increase and extension have been met, but improvements, in other times desirable, have been deferred on the score of conservation.

IMPROVED INCANDESCENT ELECTRIC LIGHTING.

This system has been extended during the fiscal year: (*a*) In New York Avenue, E, F, G, Eighteenth, and Nineteenth Streets NW., in the vicinity of and approaches to the new Interior Department building and other Federal Government buildings, 5 of 200 candle power each and 83 of 100 candle power each, replacing 41 mantle gas lamps over approximately 1.27 miles of streets; (*b*) in Virginia Avenue, C, D, E, Eighteenth, Nineteenth, and Twentieth Streets NW., in the vicinity of the new temporary Federal Government buildings, 49 of 100 candle power each, replacing 30 mantle gas lamps, over approximately 1.33 miles of streets. This latter item being that portion of a total ordered of 75 of 100 candle power each, in the area Seventeenth to Twenty-third, B to E Streets.

ARC LIGHTING.

This system has been affected very slightly, resulting in a net decrease of four lamps.

LIGHTS ALONG STEAM RAILROADS.

The situation with respect to the several suits brought by the District of Columbia against steam railroad companies to compel repayment for the sums expended by the District on maintaining lights along the respective rights of way of such companies, is essentially as reported last year. The litigation has persisted for many years and suits in sums aggregating upward of $38,000 are now before the courts and grounds for further suits continue to accumulate. The appointment of a commission to investigate and report upon this matter is recommended.

Lamps of all kinds in service July 1, 1918, as compared with July 1, 1917.

Kind of light.	1917	1918	Kind of light.	1917	1918
Mantle gas	10,392	10,417	Electric incandescent—Cont'd.		
Electric arc:			60-candlepower, multiple	321	321
6.6-ampere magnetite	279	280	4-glower Nernst	64	64
4-ampere magnetite	522	517	Street designation lamps:		
Electric incandescent:			Gas	392	393
250-candlepower, series	4	10	Electric	97	119
100-candlepower, series	3,604	3,699			
100-candlepower, multiple	98	98	Total	19,240	19,506
60-candlepower, series	3,467	3,588			

Net increase during year, 266 lamps.

During the year the following changes have been made in the various forms of street lighting:

Kind of light.	Added.	Discontinued.	Kind of light.	Added.	Discontinued.
Mantle gas	78	[1] 53	Street designation lamps on fire-alarm posts:		
Electric arc:			Gas	8	[3] 7
6.6-ampere magnetite	3	2	Electric incandescent	23	11
4-ampere magnetite	.....	[2] 5			
Electric incandescent:			Total	350	84
250-candlepower, series	6	.....			
100-candlepower, series	103	8			
60-candlepower, series	128	7			
60-candlepower, multiple	1	1			

[1] Of this number, 47 were replaced by 100-candlepower incandescent electric lamps.
[2] These 5 lamps were replaced by 100-candlepower incandescent electric lamps.
[3] Of this number, 6 were replaced by incandescent electric (fire-alarm) lamps.

Net increase during the year, 266 lamps.

SUMMARY OF CHANGES.

Net increase in number of lamps	266
Discontinued	26
Replaced by other kinds	58
Total changes	350

Cable installed and withdrawn during the year and amount in service June 30, 1918.

INSTALLED.

Size of cable.	Signal.		Telephone.			Combination.					Total.			
	Cable.	Conductors (Brown & Sharpe), No. 14.	Cable.	Conductors (Brown & Sharpe).		Cable.	Conductors (Brown & Sharpe).				Cable.	Conductors (Brown & Sharpe).		
				No. 19.	No. 22.		No. 14.		No. 19.			No. 14.	No. 19.	No. 22.
	Feet.	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*No.*	*Feet.*	*No.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*
60 pair			250	30,000							250		30,000	
50 pair			9,275	927,500							9,275		927,500	
30 pair			1,143	68,580							1,143		68,580	
25 pair			4,969	248,450							4,969		248,450	
20 pair			2,155	86,200		4,725	10	94,500	10	94,500	6,880	94,500	180,700	
15 pair			3,580	107,400		175	8	2,800	7	2,450	3,755	2,800	109,850	
12 pair						5,134	6	61,608	6	61,608	5,134	61,608	61,608	
8 pair						28,372	4	226,976	4	226,976	28,372	226,976	226,976	
5 pair						114	3	684	2	456	114	684	456	
3 pair						1,495	2	5,980	1	2,990	1,495	5,980	2,990	
Total			21,372	1,468,130		40,015		392,548		388,980	61,387	392,548	1,857,110	

WITHDRAWN.

30 pair						25	10	500	20	1,000	25	500	1,000	
8 pair						444	4	3,552	4	3,552	444	3,552	3,552	
5 pair						124	3	744	2	496	124	744	496	
3 pair						1,169	2	4,676	1	2,720	1,169	4,676	2,720	
Total						1,762		9,472		7,768	1,762	9,472	7,768	

IN SERVICE JUNE 30, 1918.

150 pair			7,941		2,382,300						7,941			2,382,300
100 pair			2,310		462,000						2,310			462,000
100 pair			10,812	2,162,400							10,812		2,162,400	
90 pair						480	30	28,800	60	57,600	480	28,800	57,600	
80 pair						4,503	30	270,180	50	450,300	4,503	270,180	450,300	
75 pair			4,275	641,250							4,275		641,250	
70 pair						1,857	30	111,420	40	148,560	1,857	111,420	148,560	
55 pair						2,785	15	83,550	50	278,500	2,785	83,550	278,500	
60 pair			250	30,000		2,940	30	176,400	30	176,400	3,190	176,400	206,400	
55 pair						11,401	15	342,030	40	912,080	11,401	342,030	912,080	
50 pair	2,533	253,300	15,707	1,359,300	211,400						18,240	253,300	1,359,300	211,400
45 pair						6,214	20	248,560	25	310,700	6,214	248,560	310,700	
45 pair						20,919	15	627,570	30	1,255,140	20,919	627,570	1,255,140	
40 pair						7,542	15	226,260	25	377,100	7,542	226,260	377,100	
35 pair						23,767	15	713,010	20	950,680	23,767	713,010	950,680	
35 pair						4,633	17	157,522	16	148,256	4,633	157,522	148,256	
30 pair	13,019	781,140	4,179	250,740		574	15	17,220	15	17,220	17,772	798,360	267,960	
30 pair						67,001	10	1,340,020	20	2,680,040	67,001	1,340,020	2,680,040	
25 pair			20,010	1,000,500		25,389	10	507,780	15	761,670	45,399	507,780	1,762,170	
20 pair			12,071	482,840		24,517	10	490,340	10	490,340	36,588	490,340	973,180	
18 pair						5,494	8	87,904	10	109,880	5,494	87,904	109,880	
15 pair	19,247	577,410	3,652	109,560		7,786	8	124,576	7	109,004	30,685	701,986	218,564	
14 pair						7,016	6	84,192	8	112,256	7,016	84,192	112,256	
12 pair	12,489	299,736				75,034	6	900,508	6	900,508	87,523	1,200,244	900,508	
10 pair	570	11,400				24,903	5	249,030	5	249,030	25,473	260,430	249,030	
8 pair						209,641	4	1,677,128	4	1,677,128	209,641	1,677,128	1,677,128	
6 pair						5,984	4	47,872	2	23,936	5,984	47,872	23,936	
5 pair						32,703	3	196,218	2	130,812	32,703	196,218	130,812	
3 pair						117,248	2	468,992	1	234,114	117,248	468,992	234,114	
Total	47,858	1,922,986	81,207	6,036,590	3,055,700	690,331		9,177,082		12,561,254	819,396	11,100,068	18,597,844	3,055,700

Installed, 11.626 miles of cable containing 426.7 miles of conductor; withdrawn, 0.33 mile of cable containing 3.265 miles of conductor; in service June 30, 1918, 155.188 miles of cable containing 6,203.335 miles of conductor.

Amount of space occupied by cable installed and withdrawn during year and that in service July 1, 1918.

	Space occupied by cable.		
	Installed during year.	Withdrawn during year.	In service July 1, 1918.
	Feet.	*Feet.*	*Feet.*
District of Columbia	15,333	1,262	195,826
Chesapeake & Potomac Telephone Co	43,218	500	575,356
Washington Railway & Electric Co.[1]	2,836	.....	31,144
United States Government	.....	.....	1,536
Western Union Telegraph Co	.....	.....	7,180
Washington Terminal Co	.....	.....	1,019
Submarine cable	.....	.....	150
Placed in parking	.....	.....	3,817
Miscellaneous	.....	.....	3,368
Total	61,387	1,762	819,396

[1] Under this name are included the conduits of all companies controlled by this corporation.

Aerial cable in service June 30, 1918.

Size of cable.	Telephone.		Combination.					Total.		
	Cable.	Conductors, No. 19, (Brown & Sharpe).	Cable.	Conductors (Brown & Sharpe).				Cable.	Conductors (Brown & Sharpe).	
				No. 14.		No. 19.			No. 14.	No. 19.
				Pair.	Conductors.	Pair.	Conductors.			
	Feet.	*Feet.*	*Feet.*	*No.*	*Feet.*	*No.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*
25 pair	.....	.....	7,358	10	147,160	15	220,740	7,358	147,160	220,740
15 pair	.....	.....	8,625	6	103,500	9	155,250	8,625	103,500	155,250
12 pair	.....	.....	9,558	6	114,696	6	114,696	9,558	114,696	114,696
8 pair	.....	.....	852	4	6,816	4	6,816	852	6,816	6,816
Total	.....	.....	26,393	.....	372,172	.....	497,502	26,393	372,172	497,502

In service June 30, 1918, 4.999 miles of cable containing 164.71 miles of conductor.

TELEPHONE SYSTEM.

The following 38 telephones were added to the two switchboards of the department during the year:

District Building:
- Office selective military service headquarters (one extension) room 513..... 2
- Selective military service local board—
  - No. 1, room 314..... 1
  - No. 2, room 20..... 1
  - No. 4, room 403..... 1
  - No. 8, room 5..... 1
  - No. 9, room 112–A and corridor, first floor..... 2
  - No. 11, room 115..... 1
- Office corporation counsel, extension, room 413..... 1
- Office purchasing officer, room 316..... 1
- Office superintendent of insurance, statistical division, room 227..... 1
- Office of the assessor, extension, room 103..... 1
- Office of health officer, room 202–A..... 1
- Office chief engineer, fire department, extension, room 5..... 1
- Office superintendent of county roads, extension, room 412..... 1
- Office secretary to the board of commissioners, extension, room 509..... 1

Outside offices:
- Selective military service, division No.—
  - 1, Franklin School Building 1
  - 2, old Central High School Building 1
  - 8, old Central High School Building 1
  - 9, Henry D. Cooke School Building 1
  - 10, tenth precinct police station 1
  - 11, old Central High School Building 1
- Municipal garage 2
- Office of the market master, Eastern Market 1
- Office of the market master, Western Market 1
- Office of the market master, Farmers' Produce Market 1

Public schools:
- Thomson School 1
- Powell School (one extension) 2
- Old M Street High School 1
- M Street High School 3
- Business High School, extension 1
- Eastern High School (one extension) 2

The following 28 telephones on these switchboards were discontinued during the year:

District Building:
- Office of the selective service registration bureau, room 227 1
- Office of the selective service, division No. 1, room 314 1
- Office of the selective service, division No. 8, room 5 1
- Office of selective service, division No. 9, corridor, first floor 1
- Office of selective service, division No. 11, room 115 1
- Office of Maj. Powell, assistant to the engineer commissioner, room 308 2
- Office of the captain of the watch, room 20 1
- Office of the Excise Board, room 513 1
- Office of the engineer commissioner, extension, room 522 1
- Blue print room (room 18) 1

Outside offices:
- Selective service, division No.—
  - 1, Franklin School Building 1
  - 2, old Central High School Building 1
  - 8, old Central High School Building 1
  - 9, Henry D. Cooke School Building 1
  - 10, tenth precinct police station 1
  - 11, old Central High School Building 1
- Office of the assessor, old City Hall Building 1
- Offices of the judges of the municipal court 5
- District repair shop, U Street, between Sixteenth and Seventeenth Streets, NW 4

Public schools: Old Central High School, extension 1

Fire department switchboard: One telephone, extension, in the office of the chief engineer, was discontinued during the year.

Police department switchboard: One telephone in Potomac Park at the Highway Bridge was discontinued during the year.

New Central High School switchboard: Five telephones were added to this switchboard during the year.

McKinley Manual Training School switchboard: One telephone was added to this switchboard during the year.

Franklin School switchboard: Six telephones, Franklin School Building, were added to this switchboard during the year.

During the year a switchboard with 6 sets of instruments was installed in the municipal court; one with 6 sets of instruments in the District repair shop and one with 20 sets of instruments in the public library.

Number of telephones connected to the District system July 1, 1918.

Offices in the District Bullding	188
Outside offices and institutions	85
Residences	3
Public schools	217
Fire department	55
Police department	51
Water department, private branch exchange	42
Franklin School, private branch exchange	36
Western High School, private branch exchange	17
McKinley Manual Training School, private branch exchange	16
James Ormond Wilson Normal School, private branch exchange	29
Miner Normal School, private branch exchange	12
New Central High School, private branch exchange	36
Dunbar High School, private branch exchange	18
Washington Asylum and Jail, private branch exchange	17
Public library, private branch exchange	20
Municipal court, private branch exchange	6
District repair shop, private branch exchange	6
Police patrol service	462
Total	1,316

There are 27 portable telephone sets in service, the property of the District of Columbia. These instruments are used by the fire department and the employees of the electrical department.

STORAGE BATTERY SYSTEM.

The number of cells of storage battery in service July 1, 1918, was as follows:

On fire-alarm circuits	1,862
On patrol circuits	226
On local circuits	86
Total	2,174

DISTRICT UNDERGROUND CONDUIT AND CABLE SYSTEM.

The following conduit connections were made to the underground system:

Fire-alarm posts (total, 17).

Sixteenth and W Streets SE.
Tenth and E Streets SW.
Eighth and G Streets SW.
Twenty-first and L Streets NW.
Eighth and Q Streets NW.
Eleventh and K Streets NW.
Thirty-third Street and Wisconsin Avenue NW.
Eighteenth and Newton Streets NW.
Georgia Avenue and Webster Street NW.
Connecticut Avenue and Calvert Street NW.
Georgia Avenue and Crittenden Street NW.
Seventeenth Street and Columbia Road NW.
Wisconsin Avenue and Thirty-seventh Street NW.
Georgia Avenue and Gresham Place NW.
Georgia Avenue and Euclid Street NW.
Georgia Avenue and Butternut Street NW.
Eighth and H Streets NE.

Patrol posts (total, 14).

Thirteenth and W Streets SE.
Fifteenth and V Streets SE.
Fourteenth and U Streets SE.
First and P Streets SW.
Eighteenth Street south of F Street NW.
Eighteenth and D Streets NW.
Fourteenth and C Streets SE.
Georgia Avenue and Butternut Street NW.
Fourth and E Streets NW.
Water and F Streets SW.
First Street and Rhode Island Avenue NW.
Florida Avenue and Seaton Street NW.
Fourteenth and East Capitol Streets NE.
Fifteenth Street and Pennsylvania Avenue SE.

Connections to buildings (total, 7).

Ketcham School, Fifteenth and U Streets SE.
Van Buren School, W Street between Thirteenth and Fourteenth Streets SE.
No. 15 engine house, Fourteenth and V Streets SE.
Municipal garage, D Street between Thirteenth and Thirteen-and-a-half Streets NW.
Tabulating Machine Co. Building, 1054 Thirty-first Street NW.
Municipal fish market, Eleventh and Water Streets SW.
Farmers' Produce Market, Twelfth Street between B Street and Ohio Avenue NW.

Conduit extensions (total, 5).

Eighth and E Streets SW.
Nineteenth and F Streets NW.
Georgia Avenue and Taylor Street NW.
Thirty-fourth and Macomb Streets NW.
Eighth and K Streets NE.

In making the above-mentioned connections and extensions 6,550 feet of conduit (duct feet) and 15 manholes were built, the work being done by this department.

Connections to the underground system, July 1, 1918.

Fire-alarm posts	441	United States Government buildings	24
Police patrol posts	353	Private buildings	61
Cable terminal posts	6	Cable poles	70
Schoolhouses	78		
Fire department houses	34	Total	1,059
Police station houses	13		
Miscellaneous District buildings	19		

POLICE PATROL SYSTEM.

The following changes and new installations were made in the patrol system:

First precinct.—New installation, connected underground: Box No. 19, Fourteenth and H Streets NW.; box No. 20, Eleventh and F Streets NW.; box No. 30, Ninth and F Streets NW.

Third precinct.—The system was changed in this precinct from a two-circuit registering and bridging system to a straight telephone service, each box connected direct to the precinct station by an independent circuit. New installations, connected underground, were added as follows: Box No. 28, Sixteenth Street between L and M Streets NW.; box No. 30, Eighteenth and F Streets NW.; box No. 40, Eighteenth and D Streets NW.

Fourth precinct.—New installation, connected underground: Box No. 30, Water and F Streets SW.

Fifth precinct.—New installations, connected underground: Box No. 49, Fourteenth and C Streets SE.; box No. 50, Fifteenth Street and Pennsylvania Avenue SE. New installations, connected overhead: Box No. 22–A, United States Jail, Seventeenth and E Streets SE. Changed from overhead to underground connection: Box No. 16, Thirteenth and C Streets SE.; box No. 37, Sixteenth and C Streets SE.

Sixth precinct.—New installations, connected underground: Box No. 20, First Street between E and F Streets NW.; box No. 44, Delaware Avenue and C Street NE.

Eighth precinct.—New installations, connected underground: Box No. 17, Florida Avenue and Seaton Street NW.; box No. 46, First Street and Rhode Island Avenue NW.

Ninth precinct.—New installations, connected underground: Box No. 46, Fifth Street and Florida Avenue NE.; box No. 47, Fourteenth and East Capitol Streets NE. Changed from overhead to underground connection: Box No. 54, Montello Avenue and Oates Street NE.; box No. 121, Twenty-fourth and Douglas Streets NE.

Tenth precinct.—New installation, connected underground: Box No. 29, Eighteenth and Irving Streets NW. Changed from overhead to underground connection: Box 16, Georgia Avenue and Butternut Street NW.; box No. 53, Twelfth and Franklin Streets NE.; box 132, Seventeenth Street and Fort Drive NE.; box No. 133, Twelfth and Monroe Streets NE.

Eleventh precinct.—New installations, connected overhead: Box No. 18, Fourteenth and R Streets SE.; box No. 28, Sheridan and Stanton Roads SE.

Subprecinct, Tenleytown.—New installation, connected overhead: Box 121, Ridge Road and W Street NW.

On July 1, 1918, the distribution of boxes among the precincts was as follows:

	Wall boxes.		Booths.	Total.
	Underground.	Overhead.		
First	37			37
Second	27			27
Third	50			50
Fourth	37	2		39
Fifth	44	2		46
Sixth	28			28
Seventh	22	3		25
Eighth	27			27
Ninth	34	18		52
Tenth	49	9	1	59
Eleventh		37	1	38
Subprecinct, Tenleytown	9	19	1	29
Total	[1] 364	90	3	457

[1] 6 of these boxes at following locations are not on posts: 3, Union Station; 1, engineer stables, First and Canal Streets; 1, Tacoma Park, watch box; 1, Treasury Department.

FIRE-ALARM SYSTEM.

Thirty-six new fire-alarm boxes were placed in service during the year, 20 public and 16 private boxes, located as follows:

Public boxes.

No. 65, Eighth and H Streets NE.
No. 154, Ninth and B Streets NW.
No. 286, Eighth and Q Streets NW.
No. 292, Sixteenth and O Streets NW.
No. 458, Tenth and E Streets SW.
No. 464, Eighth and G Streets SW.
No. 572, Sixteenth and C Streets SE.
No. 727, Thirty-third Street and Wisconsin Avenue NW.
No. 728, Thirty-seventh Street and Wisconsin Avenue NW.
No. 745, Thirty-fifth and Porter Streets, NW.
No. 755, Connecticut Avenue and Calvert Street NW.
No. 964, Minnesota Avenue and M Street SE.
No. 978, Forty-eighth and Grant Streets NE.
No. 979, Division Avenue and Grant Street NE.
No. 1226, Eleventh and K Streets NW.
No. 6184, Seventeenth Street and Michigan Avenue NE.
No. 8147, Eighteenth and Newton Streets NW.
No. 8148, Seventh Street and Columbia Road NW.
No. 8171, Georgia Avenue and Webster Street NW.
No. 8172, Georgia Avenue and Crittenden Street NW.

Private boxes.

No. 368, Gun Division, Ordnance Office, War Department, 1802 Virginia Avenue NW.
No. 369, New Interior Department building, F Street, between Eighteenth and Nineteenth Streets NW.
No. 391, Council of National Defense building, D Street, between Seventeenth and Eighteenth Streets NW.
No. 392, Food Administration building, D Street, between Seventeenth and Eighteenth Streets NW.
No. 393, Fuel Administration building, C Street, between Eighteenth and Nineteenth Streets NW.
No. 394, War Trade Board building, Twentieth, Twenty-first, B, and C Streets NW.
No. 395, American Red Cross building, Seventeenth Street, between D and E Streets NW.
No. 396, Food Administration Annex, Nineteenth and D Streets NW.

No. 397, United States Fuel Administration, Twentieth, Twenty-first, and C Streets, and New York and Virginia Avenues NW.
No. 471, Supply Division, War Department, B Street, between Sixth and Seventh Streets NW.
No. 472, War Department Annex, B building, Seventh Street, between B Street north and B Street south.
No. 473, War Department Annex, C building, Seventh Street, between B Street north and B Street south.
No. 736, Tabulating Machine Co. Building, 1054 Thirty-first Street NW.
No. 8175, Walter Reed General Hospital, 6900 Georgia Avenue NW.
No. 6157, Camp Ordway, Fifth Street and Florida Avenue NE.
No. 6195, Engineer Depot No. 3, Quartermaster Department, Fourth and Channing Streets NE.

One public box, No. 536, located at Third and N Streets SE., one private box, No. 359, located in the branch printing office, War Department, F Street, between Seventeenth and Eighteenth Streets NW., and one private box, No. 366, located at the War Department stables, between Seventeenth, Eighteenth, F, and G Streets NW., were discontinued during the year.

During the year 10 boxes were changed from overhead to underground connection.

Fire-alarm boxes in service.

	July 1, 1917.	July 1, 1918.
Connected by overhead wires:		
Public boxes	70	65
Private boxes	20	21
Connected by underground wires:		
Public boxes	412	436
Private boxes	102	115
Total	604	637

Alarms received and transmitted:	
Regular box alarms	674
Alarms received from telephone stations	4
Local alarms	957
Second alarms	12
Third alarms	3
Fourth alarms	1
Fifth alarms	0
Sixth alarms	0
Total	1,651
False box alarms	88
False local alarms	22

Each fire-alarm box was tested several times during the year, the contact points cleared, and the mechanism thoroughly overhauled. This is done regularly once a month as far as possible. The total number of tests amounted to 4,916, being an average of 7.71 per box.

Alarms received by the month.

	Box.		Local.		Additional alarms.
	Number.	False.	Number.	False.	
1917.					
July	23	3	27	1	.....
August	30	1	41	1	.....
September	35	6	25	.....	.....
October	51	12	56	.....	3
November	55	1	147	3	2
December	86	5	108	2	2
1918.					
January	73	3	123	4	5
February	47	3	65	1	.....
March	62	4	143	2	3
April	69	18	84	4	2
May	76	18	76	2	.....
June	71	14	62	2	.....
Total	678	88	957	22	17

POLES.

Under the authority of the act of Congress approved June 30, 1902, regulating the use of telephone wires in the District of Columbia, the Chesapeake & Potomac Telephone Co. has reported the following amount of work done during the fiscal year:

Poles erected in streets within the prescribed area:		
Line	8	
Anchor	1	
		9
Poles erected in alleys within the prescribed area:		
Line	11	
Guy	3	
Anchors	3	
		17
Poles erected in streets outside the prescribed area:		
Line	44	
Guy	4	
Anchors	7	
		55
Poles erected in alleys outside the prescribed area:		
Line	41	
Guy	5	
Anchor	2	
		48
Total		129
Poles taken down in alleys within the prescribed area:		
Line	1	
Guy	1	
Anchors	3	
		5
Poles taken down in streets outside the prescribed area:		
Line	42	
Guy	5	
Anchor	1	
		48
Poles taken down in alleys outside the prescribed area:		
Line	3	
Guy	3	
Anchor	3	
		9
Total		62
Total erected during the year		129
Total taken down during the year		62
Net increase		67

Miscellaneous pole work—Poles erected, taken down, moved, etc.

	Erected.			Taken down.			Moved.		Replaced.		Reset.		Increase.		Decrease.	
	Line.	Guy.	Anchor.	Line.	Guy.	Anchor.	Line.	Guy.	Line.	Guy.	Line.	Guy.	Line.	Guy.	Line.	Guy.
Chesapeake and Potomac Telephone Co	104	12	13	46	9	7	25	2	75	3	25	....	58	3	....	....
Potomac Electric Power Co	221	24	68	12	4	3	38	2	65	3	8	....	209	20	....	....
Postal Telegraph-Cable Co	.....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....
Capital Traction Co	.....	....	....	....	....	....	....	....	4	1	....	....	....	....	....	....
City & Suburban Ry. Co	2	....	....	1	....	....	....	....	3	....	....	....	1	....	....	....
Columbia Ry. Co	1	....	....	....	....	....	....	....	1	....	....	....	1	....	....	....
Georgetown & Tenleytown Ry. Co	.....	....	....	....	....	....	3	....	2	....	....	....	....	....	....	....
Brightwood Ry. Co	2	....	....	1	....	....	....	....	9	....	....	....	1	....	....	....
Anacostia & Potomac Ry. Co	.....	....	....	3	....	....	4	....	2	....	5	....	....	....	3	....
Total	330	36	81	63	13	10	71	4	161	7	38	....	270	23	3	....

List of poles of all kinds, July 1, 1918.

	Line.	Guy.	Total
District of Columbia	460	13	473
United States Government	297	1	298
Chesapeake & Potomac Telephone Co	6,414	669	7,083
Potomac Electric Power Co	6,501	247	6,748
Western Union Telegraph Co	908	.....	908
Postal Telegraph-Cable Co	355	9	364
Baltimore & Washington Transit Co	30	.....	30
Capital Traction Co	204	.....	204
City & Suburban Ry. Co	87	.....	87
Washington & Great Falls R. R. Co	401	1	402
Columbia Ry. Co	463	4	467
Steam railroads	545	.....	545
Washington & Maryland Ry. Co	158	.....	158
Georgetown & Tenleytown Ry. Co	304	.....	304
Washington Interurban R. R. Co	187	4	191
East Washington Heights Traction R. R. Co	65	.....	65
Brightwood Ry. Co	341	.....	341
Washington & Glen Echo Ry. Co	8	.....	8
Capital Ry. Co	208	.....	208
Total	17,936	948	18,884

ELECTRIC WIRING INSPECTIONS.

The following tables show the amount of work performed by this department in connection with electric wiring inspections:

Permits issued by the inspector of buildings authorizing electric wiring:	
Building	591
Machinery	124
Signs	9
	724
Permits issued by the electrical department:	
For inside electrical work	2,793
For outside electrical work	99
Temporary permits:	
Electric wiring	36
Use of current	304
Without fee (ordered by the District of Columbia, etc.)	104
Building permits	895
Quarterly permits	48
Gas lamps outside	36
	4,315

Certificates issued:	
Final	2,556
Without fee	23
Preliminary	2
	2,581
Lamps and apparatus installed:	
Incandescent	57,225
Arc lamps	24
Miscellaneous	3,998
Blank outlets	306
Motors	728
Total horsepower of motors	2,856
Generators	3
Total kilowatt capacity of generators	155
Defective wiring reported by inspectors	314
Number of notices of defective wiring sent	1,134
Requests for inspection	21
Miscellaneous	101
Cooking ranges, etc	16
Inspections in connection with yearly license	151
Fees paid to the collector of taxes:	
For permits	5,178.00
For certificates	2.00
For 79 copies of Electric Wiring Rules and Regulations at 30 cents each	23.70
	5,203.70
Electric Wiring Rules and Regulations issued without fee	12

Work of inspectors of electric wiring from July 1, 1917, to June 30, 1918.

Inspections in private buildings	9,623
Inspections in municipal buildings	57
Inspections in theaters	378
Total inspections	10,058

MISCELLANEOUS WORK.

This department prepared plans and specifications for and supervised the introduction of electric wiring in the following municipal properties:

Completed work.

No. 1 police station, lighting on second floor.

Specifications prepared—Work not started.

No. 25 engine company, lighting wiring.
No. 7 police station, cell and corridor lighting.
No. 12 police station, lighting, bell and telephone wiring.
Health department clinic, lighting and X-ray machine wiring.
Franklin School, third floor lighting.
Cleveland School, roof lighting.
Thompson School, yard lighting.
New Central High School, promenade lighting.
O Street Vocational School, electric iron and sewing machine motor wiring.
Smallwood School, lighting wiring.
Reno School, lighting wiring.
Woodburn School, lighting wiring.
Petworth School, lighting wiring.
B. B. French School, power wiring.
Deanwood School, lighting wiring.

Birney School, wiring for stereopticon.
District Building, addition to engine room switchboard.
No. 6 convenience station, lighting and power wiring.
Occoquan wharf, District of Columbia, lighting wiring.
Trees and parking division shops, lighting wiring.
Public Library, new panel boards.
Cottage for Industrial Home School for colored children, lighting wiring and pole line extension.
Home for the Aged and Infirm, engines and generators for power plant.
No. 14 engine company, lighting.

Work in progress.

District Building, health department—laboratories—lighting, power and heating wiring.

GENERAL SUPPLIES.

Receipts.

Appropriation		$11,050.00
Repayments		1,556.48
		12,606.48

Expenditures.

Labor pay roll	890.32
Office expenses	631.81
Telephone rental, etc	4,284.63
Instruments and apparatus	4,116.31
Storeroom expenses	1.78
Stable expenses	14.11
Wire	738.99
Line supplies	11.65
Tools and hardware	208.64
Batteries and battery supplies	569.22
Repairs to cuts	15.91
Paints	19.40
Car tickets	50.00
Cartage, freight, and expressage	10.37
Underground supplies	196.23
	11,759.37

LIGHTING.

Receipts.

Appropriation	$415,000.00
Repayments by Baltimore & Ohio R. R. Co	337.95
Repayments by Georgetown Barge, Dock, Elevator & R. R. Co	510.47
Repayments by Washington Terminal Co.[1]	3,797.31
Repayments by Philadelphia, Baltimore & Washington R. R. Co.[1]	5,692.96
Repayments, miscellaneous	24.32
Total	425,363.01

Expenditures.

Mantle gas lighting:		
Washington Gas Light Co	$168,597.17	
Deductions for defective service	884.32	
		167,712.85
Georgetown Gas Light Co	10,495.49	
Deductions for defective service	150.80	
		10,344.69
Incandescent electric lighting:		
Potomac Electric Power Co	144,890.91	
Deductions for defective service	1,098.29	
		143,792.62

[1] Due but not paid.

Electric arc lighting:		
Potomac Electric Power Co	$63,628.60	
Deductions, commissioner's order July 15, 1915	1,806.48	
Deductions for defective service	406.20	
		$61,415.92
Street designation lighting:		
Washington Gas Light Co	3,668.10	
Deductions for defective service	5.14	
		3,662.96
Georgetown Gas Light Co	1,103.63	
Deductions for defective service	.35	
		1,103.28
Potomac Electric Power Co	259.61	
Deductions for defective service	.58	
		259.03
Labor pay roll		4,793.26
Office expenses		35.98
Traveling expenses		57.65
Storeroom expenses		75.15
Rent of storeroom		820.00
Repairs to cuts		4.99
Maintenance municipal garage		673.63
Street sign frames, etc		1,566.86
Car tickets		150.00
Lamp-posts, globes, etc		11,704.00
Tools and hardware		13.05
Stable expenses		258.12
Paints, oils, etc		41.43
Erecting, moving, and taking down lamp-posts		125.50
Street crossing lighting		127.20
		408,738.17

WIRES UNDERGROUND.

Receipts.

Appropriation	$7,000.00
Repayments	962.18
Total	7,962.18

Expenditures.

Cable	$4,120.65
Underground supplies	1,243.07
Labor pay roll	1,907.76
Tools and hardware	58.24
Repairs to cuts	91.90
	7,421.62

EXTENSION OF POLICE PATROL.

Receipts.

Appropriation	$2,500.00
Repayments	386.49
	2,886.49

Expenditures.

Cable	$1,042.00
Underground supplies	502.23
Lamp posts for police patrol boxes	434.15
Repairs to cuts	53.94
Labor pay roll	375.75
Instruments and apparatus	25.00
Wires	2.15
Police patrol boxes	98.33
	2,533.55

FIRE-ALARM BOXES.

Receipts.

Appropriation	$4,700.00
Repayments	820.76
Total	5,520.76

Expenditures.

Cable	$1,644.68
Underground supplies	502.49
Labor pay roll	268.13
Fire-alarm boxes	2,679.38
Instruments and apparatus	32.33
Repairs to cuts	213.42
	5,340.43

REPLACING POLICE PATROL SIGNALING SYSTEM.

Receipts.

Appropriation	$3,700.00
Repayments	80.71
Total	3,780.71

Expenditures.

Cable	$2,721.98
Instruments and apparatus	495.04
Underground supplies	106.66
Labor pay roll	296.37
Tools and hardware	2.70
	3,622.75

NEW CABLES.

Receipts.

Appropriation	$5,200.00

Expenditures.

Cable	$5,072.25

REPORT OF THE CHIEF CLERK OF THE ENGINEER DEPARTMENT.

WASHINGTON, D. C., *October 1, 1918.*

Sir: I have the honor to submit the following report of the operations of this office for the fiscal year ended June 30, 1918:

Communications received, briefed, recorded, and indexed	13,066
Vouchers prepared and recorded	356
Contracts drawn and indexed	203
Bonds approved and indexed	369

DANIEL E. GARGES,
Chief Clerk, Engineer Department.

The ENGINEER COMMISSIONER.

REPORT OF THE WHARF COMMITTEE.

WASHINGTON, *October 4, 1918.*

SIR: The wharf committee has the honor to submit the following report of its operations for the fiscal year ended June 30, 1918.

Accompanying is a list of wharf property now under lease on the Potomac River, the Anacostia River or Eastern Branch, and James Creek Canal.

The rentals received from Potomac River wharves for the fiscal year 1918 were $16,321.60; from the Anacostia River, $322.50.

AVAILABLE WATER FRONTAGE.

The actual water frontage in the District of Columbia, with the exception of canals devoted to commerce, is about 2 miles. The total available water frontage, exclusive of canals, which is practicable of commercial development, is about 18 miles; this frontage, however, includes the portion set apart for parks and purposes of the United States, about 8 miles.

WHARVES ALONG THE WASHINGTON CHANNEL.

The largest amount of wharf property is that along the Washington Channel. This has a total frontage on the city side of 9,275 linear feet, of which 4,675 linear feet, between the grounds of the War College and the south curb line of N Street, is under the jurisdiction of the Chief of Engineers, United States Army, and of the remaining 4,600 feet, between the south curb line of N Street south and Fourteenth Street SW., 4,021 feet is under the jurisdiction of the Commissioners of the District of Columbia, and 559 feet, between Thirteenth and Fourteenth Streets, is under the jurisdiction of the United States.

Along the frontage are located the harbor police station, the dock of the harbor boat, the house and dock of the fire boat, the District morgue, a District property yard, and the municipal fish wharf and market.

WHARVES ALONG THE ANACOSTIA RIVER.

There are only two leases for wharves along the Anacostia River. The United States Navy Yard has been extended so as to require the revocation of leases formerly made for wharf property between Third and Eleventh Streets SE. The water frontage available for commercial purposes along this river is very much restricted, due to the occupation of the navy yard, and also to the proposed Anacostia Park running eastward from the navy-yard bridge.

WHARVES ALONG THE GEORGETOWN CHANNEL.

All the wharf property along this frontage is under private control with the exception of the foot of streets. Two leases have been entered into with private parties—one for the foot of Thirty-third Street and the other for the foot of G Street NW.

JAMES CREEK CANAL.

On account of the construction of a sewer along the east bank of James Creek Canal from N to P Streets, leases along this frontage have been canceled.

DANIEL E. GARGES, *Chairman.*
D. E. MCCOMB,
RUSSELL DEAN,
Wharf Committee.

The ENGINEER COMMISSIONER.

List of wharf property under lease June 30, 1918.

POTOMAC RIVER FRONT.

Name of lessee.	Location.	Expires.	Water frontage.	Area.	Rental per year.
			Lin. ft.	*Sq. ft.*	
American Ice Co.	Space 32 by 140 feet on Tenth Street Wharf.	Oct. 1, 1918	32	4,480	$51.00
R. M. Allen	Sec. 2, structures 39 and 40, foot of Ninth Street SW.	Mar. 15, 1919	40	2,400	85.00
Capital Yacht Club	Foot of Ninth Street SW., between structures 39 and 41.	July 1, 1923	24	2,080	75.00
L. A. Clarke & Son	Sec. 2, structures 68 to 77, including 70½, foot of Tenth Street SW.	Aug. 1, 1923	280	45,000	1,500.00
Colonial Beach Co.	Sec. 1, structures 31 to 37, inclusive, Water Street between M and N Streets.	Mar. 15, 1923	132	8,000	600.00
Do	Sec. 1, structures 26 to 30, inclusive, foot of N Street SW.	May 15, 1923	120	7,000	600.00
Cranford Paving Co.	Foot of Thirty-first Street NW.	Feb. 1, 1923	53	.....	534.60
J. Maury Dove Co. (Inc.).	Sec. 3, structures 12 to 20, foot of Thirteenth Street SW.	Nov. 8, 1919	168	38,000	2,100.00
Do	Foot of G Street NW.	Monthly	100	.....	120.00
G. W. Forsberg	Sec. 2, structures 22 to 33, inclusive, except 24, foot of Eighth Street SW.	Mar. 15, 1919	156	18,000	733.00
Johnson & Wimsatt	Sec. 3, structures 5 to 11, inclusive, foot of Twelfth Street SW.	Mar. 15, 1923	190	43,500	2,244.00
Do	Sec. 2, structures 34 and 35, foot of Ninth Street SW.	do	80	18,000	720.00
Mount Vernon & Marshall Hall Steamboat Co.	Sec. 1, structures 59, 62, 63, and 64, foot of M Street SW.	do	125	10,000	630.00
Norfolk & Washington Steamboat Co.	Sec. 1, structures 60 and 65 to 72, inclusive, foot of Seventh Street SW.	Dec. 31, 1921	190	35,600	2,447.00
Potomac & Chesapeake Steamboat Co.	Sec. 2, structures 11 to 21 inclusive, foot of Eighth Street SW.	Mar. 15, 1923	198	35,600	1,200.00
Wm. A. Ragan	Sec. 3, structures 21 and 22, foot of Thirteenth Street SW.	Mar. 15, 1921	65	4,200	100.00
Do	Sec. 3, structure 23, foot of Thirteenth Street SW.	May 1, 1921	18	1,440	50.00
Chas. E. Sanford et al.	Sec. 2, structures 36, 37, and 38, foot of Ninth Street SW.	Mar. 15, 1921	44	3,320	130.00
Jos. P. Stephenson, Stephenson & Bro.	Sec. 2, structures 1 to 10, inclusive, foot of Seventh Street SW.	Jan. 31, 1922	300	59,900	2,402.00
District of Columbia:					
Municipal fish wharf and market.	Sec. 2, structures 78 to 82, inclusive, and 85 to 97, inclusive, structures 98 to 129, inclusive.	.....	700	152,100	.....
Do	Sec. 3, structures 1 to 4, inclusive, Water Street between Tenth and Twelfth Streets, SW.	.....	126	11,015	.....
Property yard	All water frontage on Water Street between H and I Streets SW.	.....	503	96,370	.....
Fire-boat wharf	Sec. 1, structures 39 and 40, Water Street between N and M Streets.	.....	.....	.....	.....
Morgue	Sec. 1, structures 41 and 42, Water Street between N and M Streets.	.....	.....	.....	.....
Harbor master's wharf.	Sec. 1, structure 38, and section 2, slip between structures 41 and 42.	.....	.....	.....	.....
United States site of central heat and power plant.	Water Street between Thirteen-and-a-half and Fourteenth Streets SW.	.....	359	38,975	.....
Do	Sec. 3, structures 24 to 27, inclusive, foot of Thirteenth Street, SW.	.....	200	26,600	.....
Total					16,321.60

ANACOSTIA RIVER FRONT (EASTERN BRANCH).

Edward S. Dean	Water front between the lines of N Street SE.	Monthly	.....	.....	$67.50
Standard Oil Co	Water front between building lines of Q Street SE.	Dec. 31, 1921	.....	.....	255.00
District of Columbia sewer division.	Foot of First Street SE., opposite lot 1, square south of square 744.	.....	330	.....	.....
United States Superintendent of Capital Buildings and Grounds.	Foot of First Street SE., opposite square south of square 744.	.....	40	.....	.....
Total					322.50

REPORT OF THE ASSISTANT ENGINEER IN CHARGE OF ROCK CREEK PARK.

WASHINGTON, D. C., *October 10, 1918.*

SIR: The following report of work done during the fiscal year 1918 is respectfully submitted:

The appropriation for the year was $22,000, with repayment of funds in the sum of $34.47, making a total of $22,034.47, of which the sum of $13,316.46 was expended for labor and material, and a balance of $7,718.01 remained unexpended. An itemized statement of this expenditure is submitted herewith.

Appropriation for Rock Creek Park, 1918.

Job No.	Work.	Labor.	Material.	Total cost.
2600	General care and repair	$9,848.88	$2,735.00	$12,583.88
2601	Farming	547.75		547.75
	Blacksmithing, including material			272.94
	Forage			428.61
	Tools and implements			149.85
	Miscellaneous items			79.85
	Unpaid bills			253.58
	Unexpended balance			7,718.01
		10,396.63	2,735.00	22,034.47

Appropriation	$22,000.00
Repayments	34.47
Total	22,034.47

Material items:	
Cement	$40.60
Terra-cotta pipe	101.16
Oil	614.42
Kerosene	14.50
Lumber	21.55
Roofing	65.58
Stone and hauling	708.59

Material items—Continued.	
Demurrage	$6.00
Bituminous patching material	1,154.00
Coal	8.60
Total	2,735.00

On account of the difficulty in obtaining labor and materials and the high prices prevailing for both, no large item of new construction was undertaken during the year, resulting in the unexpended balance shown.

In connection with the repair which was made for the sewer contractor by the park force of the opening for the Rock Creek intercepting sewer, the part of which between the Boulder Bridge and the Military Road was completed during the year, the roadway of the Beach Drive was repaired; and it was also widened about 3 feet for most of the distance, giving a width of macadamized roadway of from 20 to 24 feet. A retaining wall was built along a part of the road lying close to the creek just above Boulder Bridge, to provide for the additional width. This was completed except the coping stones. The junction of the Morrow Road with the Military Road was also widened, and a short stretch of the roadway of Beach driveway at that junction was eliminated.

In January all of the small rustic foot bridges crossing the creek, except one, were carried away by ice. These were mostly replaced during the spring and summer.

Besides the special items named, the general care and maintenance of the park was continued. This consisted of repairs to roadways, footpaths, bridle paths and fords, mowing grass, cutting dead timber and clearing out underbrush in overgrown places; cleaning out litter left by visitors; cultivation of land for the production of feed for the park teams; fertilizing grass land and sowing grass seed; the protection of shrubery and flowering trees from injury by trespassers; and the prevention and quenching of forest fires. About 13 acres of suitable land was cultivated and this provided the larger part of the feed for horses used in the park. About 250 cords of cordwood was cut and sold to the public schools, or transferred to the surface division for public use.

The park was policed, as heretofore, by a detail, during a part of the day, of two mounted members of the District police force. On account of the greatly increased use of the park, this detail is entirely insufficient during the summer to control the

operation and parking of vehicles; to prevent the spoliation of plants and foliage, and to enforce the park regulations. An increase to a force of not fewer than 10 men for both night and day service, during the season of greatest use of the park, is recommended.

Under the contract, made during the previous fiscal year with Olmsted Bros., Brookline, Mass., for making a study and furnishing a comprehensive plan for the improvement of the park, only a preliminary report was made during the year 1918. Aside from the difficulty in having work done on account of war activities, it has not been considered wise to undertake any new project of considerable extent until a complete report has been made and adopted.

With the adoption of such a general plan, which will furnish the basis for all future work, the park will enter upon a new era of greater development. The work done heretofore has consisted mainly of opening the fields and forests, of which the park was formed, by constructing a skeleton of roads, bridle paths and footpaths, constructing the necessary bridges, and clearing adjacent portions of the park sufficiently to permit its general use by the public. This work may be considered to have been largely preliminary, leaving the larger development of the park as a pleasure ground to such time as greater need for it should arise. Most of the roads built will require widening as a part of the development, where practicable.

During the time since this park was created there have been built about 9.2 miles macadamized park roadways from 18 to 24 feet wide, in addition to the reconstruction of 1.9 miles of county roads passing through the park, nearly all involving heavy grading; about 20 miles of bridle paths, and about 6 miles of footpaths. One large permanent stone bridge (Boulder Bridge) and one temporary girder bridge, at the north end of the park, have been built across Rock Creek; and five masonry bridges or viaducts have been built across smaller streams, besides numerous masonry culverts. The dam at Pierce Mill was constructed of bowlders.

A considerable area of the park near the roads has been cleared, and the portion opened has been maintained in suitable condition for use by constant attention. This work has all been done from the annual appropriations, which have amounted to $329,333.98 in 19 years, or about $17,300 per year. As the annual cost of maintenance alone has been from $10,000 to $12,000, it appears that the work so far accomplished has been done at a low cost when the original condition is taken into consideration.

L. R. GRABILL,
Assistant Engineer, Rock Creek Park.

To ENGINEER COMMISSIONER,
Secretary, Board of Control, Rock Creek Park.

REPORT OF SUPERINTENDENT OF STABLES.

WASHINGTON, D. C., *October 5, 1918.*

SIR: I have the honor to submit the following report showing the operation of the stables under the care of the superintendent of stables, engineer department, District of Columbia, for the fiscal year ended June 30, 1918.

LIST OF FIVE STATEMENTS ATTACHED.

1. Location of stables and departments using same.
2. Number of employees and departments to which assigned.
3. Number of horses, mules, vehicles and harness, and departments to which assigned.
4. Average cost of upkeep of horses.

Congress in making appropriations for the District of Columbia does not provide funds for the operation and maintenance of the engineer stables, except to the extent of designating and making provision for several annual employees. This, therefore, necessitates the superintendent requesting the several heads of the departments to annually make allotment to the superintendent on a pro rata basis from appropriations designated by said head for the maintenance of the stables. This method, however, was revised by the assistant to the engineer commissioner, District of Columbia, and last year witnessed the inauguration of his simplified plan whereby funds were acquired with which to operate the stables, the same being as follows: (1) Overhead charges, or transportation for the assistants to the engineer commissioner, District of Columbia; (2) departmental charges; and (3) quarterly requisitions on departments for forage and other supplies. Since this system has been in force it has proved entirely satisfactory as well as greatly diminishing the number of papers handled.

It is recommended on account of its value as a pasturage that the commissioners continue to retain control of the land in Rock Creek Park some time ago courteously loaned to them by the board of control of that park for that purpose. This tract has now attained a high state of cultivation for grazing, and in view of the fact that animals in order to be kept in the best physical condition should have a certain period of rest each year, it is aimed to so treat them, and for this purpose we have available the above farm, where they are free from work, shoes and harness and may roam as they see fit. Several other departments of the District owning horses, appreciating the value of such a place, take advantage thereof.

Respectfully,

J. W. BEALE,
Superintendent of Stables.

The ENGINEER COMMISSIONER.

STATEMENT 1.—*Location of stables and departments using same.*

1. *First and Canal Streets SW.*—Disbursing officer; plumbing inspector; sewer department; surface division (part); surveyor; weights, measures, and markets.
2. *U Street stables, U Street between Sixteenth and Seventeenth Streets NW.*—Municipal architect, repair shop, surface division (part).

STATEMENT 2.—*Number of employees and departments to which assigned.*

	Employees.					
	Annual.			Per diem.		
	Blacksmiths.	Drivers.	Watchmen.	Drivers.	Stable men.	Watchmen.
All			3		3	1
Municipal architect				1		
Plumbing inpsector				1		
Repair shop				8		
Sewer department				28		
Surface division	1			25		
Surveyor				2		
Weights, measures, and markets		1				

STATEMENT 3.—*Number of horses, mules, vehicles and departments to which assigned.*

	Horses.	Mules.	Vehicles.	Harness (sets).
Disbursing office	1		1	1
Electrical department	1		1	1
Municipal architect	1		1	1
Plumbing inspector	1		1	1
Repair shop	13	3	10	8
Sewer department	10	27	40	36
Surface division	18	13	30	33
Surveyor	2		2	2
Weights, measures, and markets	4		4	4
Emergency	2		2	2

Horses	53
Mules	43
Total	96

NOTE.—Three horses transferred to Occoquan, Va., three sold and 6 horses received from the fire department.

STATEMENT 4.—*Average cost of upkeep of horses during the fiscal year 1918.*

Forage (allowance for 1 horse for 1 month):	
100 pounds rye straw, straight, No 2, at $1,209 per 100 pounds	$1.21
210 pounds long timothy hay, at $1.374 per 100 pounds	2.89
210 pounds mixed clover hay, at $1.309 per 100 pounds	2.75
384 pounds oats, at $2.254 per 100 pounds	8.66
50 pounds bran, at $1.811 per 100 pounds	.91
Total cost of forage for 1 horse per month	16.42
Forage for 1 horse for 1 year	197.04
Shoes, $1 per month	12.00
Total	209.04

REPORT OF SUPERINTENDENT OF THE DISTRICT BUILDING.

WASHINGTON, D. C., *September 4, 1918.*

GENTLEMEN: I submit the following report on the care of the District Building for the fiscal year ended June 30, 1918.

The routine work incident to the care of the District Building involves several distinct functions, viz, the power plant; woodworking, paint, and electrical shops; blue print and photo shop; printing shop; and the elevator, watch, and cleaning forces. In addition the central garage, which was put in operation on January 1, 1918, has been under the supervision of the superintendent of the District Building.

Conditions unusually difficult have prevailed during the year. Due to the location in the building of a number of exemption boards, as well as various other councils and agencies pertaining to the war, the use of the building by the general public has very greatly increased, especially at night. This has resulted in exceptional demands upon the heating and lighting system, the elevator, watch, and cleaning services. On the other hand it has been almost impossible to maintain efficient service, due to loss of and changes among employees.

Power Plant.—During the year 2,313 tons of coal were consumed, an increase of 453 tons over the amount required during the preceding year. The weather was extremely unfavorable, being unusually severe from December 1, 1917, to about March 15, 1918. The coal furnished was of a very poor grade, averaging about 20 per cent of ash; this percentage at times run as high as 32 per cent. Electric current generated and consumed amounted to 462,900 kilowatt hours; of this total, 317,640 kilowatt hours were used for lighting, and 145,260 kilowatt hours were used for power. Power consumed was used largely in operating the elevators, an appreciable amount, however (30,460 kilowatt hours), was consumed by the fire alarm apparatus, and in the laboratories of the health department, and the inspector of asphalts and cements.

The heating and ventilating systems were in operation eight months. The removal of ashes for the year cost $180. Waste paper amounting to 60,745 pounds was baled and delivered to the contractor. Only minor repairs were made during the year. During the winter particular attention was paid to the regulation of room temperatures in the effort to economize fuel.

Woodworking and painting.—An unusual amount of work of this character was undertaken and completed during the year. A number of corridors were partitioned off, and numerous shifts were made in office arrangements to provide space for exemption boards and other war agencies.

Electrical work.—Electric appliances, including the lighting system, fans, batteries, have received the usual and ordinary amount of attention. Satisfactory service has been generally obtained. The tube system should be provided with a new motor for the compressor, but effort is being made to retain the old one in service until after the war.

The elevator service has not been satisfactory at all times. Demands on this service have greatly increased, while it has been found impossible to retain efficient operators at the salaries paid. A number of male operators have been replaced by women.

Blue print and photo shop.—Nine hundred and sixty-seven orders for blue prints were completed at a cost of $980.84; 153 orders for photographs were received and executed at a cost of $600.23.

Printing shop.—Five hundred and fifty-one orders for printing for the various departments were received and completed at a cost of $5,753.40. The cost of this work is believed to be reasonable and the work itself unusually satisfactory.

Cleaners.—The present method of carrying cleaners on the annual roll is unsatisfactory. Estimates for the fiscal year 1920 will contain provision for placing all such employees on the per diem roll.

Funds.—The regular appropriation for care of the building was $17,000. It was necessary to augment this by a deficiency appropriation of $10,000. Increased cost of maintenance was due largely to the marked advance in the cost of coal.

Central garage.—The central garage was placed in operation on January 1, 1918. All passenger vehicles maintained from the contingent fund were assigned to the garage, and a few vehicles maintained from other appropriations have been cared for and housed therein. As additional cars are procured, the service can be gradually extended to meet the transportation requirements of the municipal government. Based on the experience gained during the first six months of operation, a definite set of regulations to govern the administration of the garage will be drawn up and submitted to the commissioners in the near future.

J. J. LOVING,
Colonel, Engineers, United States Army,
Superintendent, District Building.

The COMMISSIONERS OF THE DISTRICT OF COLUMBIA,
(Through the Engineer Commissioner.)

REPORT OF THE BOARD FOR THE CONDEMNATION OF INSANITARY BUILDINGS.

WASHINGTON, *September 20, 1918.*

GENTLEMEN: We have the honor to submit the following report for the year ended June 30, 1918:

Buildings on which action was taken in response to notices served under the act creating the Board for the Condemnation of Insanitary Buildings during the year ended June 30, 1918.

	Examined.	Demolished.	Repaired.	No action necessary.	Value of repairs.	Pending.
Buildings in streets	147	52	39	40	$7,100	16
Buildings in alleys	64	15	3	36	175	10
Buildings condemned under section 16 of Building Code:						
Buildings in streets	38	29	.....	.....	.....	9
Buildings in alleys	.....	.....	.....	.....	.....	.....
Total	249	96	42	76	7,275	35

Buildings acted upon since the creation of the Board for the Condemnation of Insanitary Buildings up to and including June 30, 1918:

	Examined.	Demolished.	Repaired.	No action necessary.	Pending.
Buildings in streets	2,970	1,458	1,111	376	25
Buildings in alleys	3,988	691	523	2,764	10
Total	6,958	2,149	1,634	3,140	35

Total number of meetings of the Board for the Condemnation of Insanitary Buildings for the year ended June 30, 1918	11
Number of preliminary notices served for the year ended June 30, 1918	93
Condemnation notices served	17
Condemnation notices affixed to buildings	17
Condemnation notices served under section 16 of the Building Code	24
Inspections and miscellaneous visits made in connection with the service of notices	2,067
Estimated number of tenants required to secure other living quarters through the action on the part of the Board for the Condemnation of Insanitary Buildings for the year ended June 30, 1918	150
Estimated number of tenants required to secure other living quarters through the action on the part of the board for the condemnation of Insanitary Buildings since the creation of the board	6,172
Estimated number of tenants benefited by repairs for the year ended June 30, 1918	200
Estimated number of tenants benefited by repairs since the creation of the board	5,466
Estimated value of repairs required through action on the part of the Board for the Condemnation of Insanitary Buildings for the year ended June 30, 1918	7,275

The act of Congress approved September 25, 1914, declaring the use or occupation of any building or other structure erected or placed on or along any alley as a dwelling or residence or place of abode by any person or persons is injurious to life, to public health, morals, safety, and welfare of the District of Columbia, and such use or occupation of any such building or other structure on, from, and after the 1st day of July, 1918, shall be unlawful, was amended by an act of Congress approved May 23, 1918, which amendment provides "that the operation of the second paragraph of section 1 (relating to the use or occupation of alley buildings as dwellings) in the same hereby is postponed until the expiration of one year following the date of the proclamation by the President of the exchange of the ratification of the treaty of peace between the United States and the Imperial German Government."

Minor repairs have been made to a number of buildings, both in alleys and streets, through informal requests of the board by many owners and agents for which notices were not served nor permits required by the inspector of buildings and consequently no record was kept by the board.

J. J. LOVING,
Colonel, Corps of Engineers, United States Army,
Assistant to the Engineer Commissioner.
W. C. FOWLER, M. D.,
Health Officer, District of Columbia.
JOHN P. HEALY,
Inspector of Buildings, District of Columbia,
Board for the Condemnation of Insanitary Buildings.

To the COMMISSIONERS OF THE DISTRICT OF COLUMBIA.

APPENDIX.

Specifications for Paving Streets and Avenues with Sheet Asphalt and Asphalt Block.

1. *Work.*—The work to be done under this proposal and contract will consist of paving with sheet asphalt or asphalt block such streets, avenues, and roads in the District of Columbia, or parts thereof, or doing any portion of such work, as may be ordered in writing by the Commissioners of the District of Columbia under appropriations for the fiscal year ending June 30, 1918.

A list of streets expected to be paved under this contract will be furnished on application. In case the price bid justifies such action, the commissioners reserve the right to add streets to this list. The commissioners also reserve the right to regulate the order in which the work shall be executed, as may appear most advantageous to the District. All work under the contract must be completed prior to June 30, 1918, unless authorized by the Engineer Commissioner to be completed at a later date.

2. *Amount of work.*—The estimated amount of this work is as follows:

	Sq. yds.
Standard sheet-asphalt pavement on concrete base	68,000
Vitrified block gutters on concrete base	4,600
Asphalt block	27,000

These amounts are approximations only and may be considerably varied from; but they will be used in canvassing bids and the awards will be based thereon. Bids will be scheduled on the basis of the prices named for pavements with a 6-inch concrete base, but the prices named for a 5-inch base will be incorporated in the contract and such work as may be so directed will be executed and paid for as such.

3. *Bids.*—The contractor will, for the prices bid, do all the work prescribed in these specifications; do all the necessary grading and trimming of the roadbed and all rolling; provide bridges, fences, and other means of maintaining travel on intersecting streets, roads, and railroads, and all private driveways after giving due notice to parties affected thereby; maintain the same in good and safe condition as long as may be necessary, and then remove such temporary expedients and restore such roads to their proper condition; provide watchmen, lights, fences, and other precautionary measures necessary to the protection of person and property; furnish all materials (except as specified); and all tools and implements, labor, and transportation required to lay and put in complete order for use the specified pavement; and do each and all of these to the satisfaction of the engineer. Upon the completion of the work he will remove any temporary structures erected during the progress of the work, and restore all fixtures, pavements, and parkings, both public and private, to satisfactory condition.

4. *Old material.*—Old material removed from the streets will be the property of the District of Columbia and the work of removal will be paid for at prices named in paragraph 14 of these specifications. Granite blocks, cobble, old curb, etc., must be removed to the nearest property yard or to such other places as the engineer may direct.

5. *Grading and subgrade.*—Lines and grades will be established by the engineer, and no work will be commenced until these are given. The area over which the pavement is to be laid must be excavated to the proper depth below the surface of the pavement when completed, any objectionable or unsuitable matter below the bed being removed to such depth as may be directed by the engineer and the space filled with suitable material thoroughly compacted. The bed, after being trimmed so as to be parallel to the surface of the pavement when completed, will be thoroughly compacted by rolling, with a roller weighing not less than 5 tons and by heavy ramming at places which can not be

reached by the roller, dampening the bed before rolling and ramming, if required to the satisfaction of the engineer. No extra allowance will be made for trimming or rolling, but the volume of earth, etc., removed will be paid for as grading of its class. Any filling will be done in layers not exceeding 12 inches in thickness, and all materials used for this purpose will be subject to approval. If improper or unsuitable material be used, it will be removed at the cost of the contractor. All measurements will be made in place, and payments made thereon. Should the grading involve work in both "cut" and "fill," the measurement of it will be computed on the basis of the volume of the material in place in the "cut" only; the excavated material from the "cut" section deposited in the "fill," will not be again paid for as "fill." Should the amount of cut on the street not suffice to make the necessary fill, the amount borrowed from other designated localities will be paid for as grading.

6. *Six-inch concrete base.*—Upon the bed prepared as described in paragraph 5 there will be laid 6-inch foundations of concrete as directed, made of the following materials by volume:

One part Portland cement, 3 parts sand, 7 parts gravel.

Broken stone, run of the crusher, may be substituted for part or all of the gravel at the option of the contractor.

(*a*) *Cement.*—The cement used will be a standard brand of Portland cement, uninjured by age or exposure, and delivered at the work in original undamaged packages. The right is reserved to reject any cement that has not established itself as a high-grade Portland cement and has not been made by the same mill for two years and given satisfaction in use for at least one year under climatic and other conditions of at least equal severity as those of the work proposed. The contractor shall keep the cement in store, under proper cover, in the city of Washington, and shall properly protect it until used. The engineer shall have the right to test the cement as he judges necessary and to reject any or all lots. The cement, after being accepted, can not be transferred or used by the contractor on other work without the consent of the engineer commissioner. The cement while in storage or upon the work or while being hauled upon the work, shall be properly protected, and no cement shall be used which, in the opinion of the engineer, has been injured by age or exposure.

No cement shall be used upon the work until it has been tested in the office of the engineer commissioner and accepted by him, the tests to extend over such length of time not exceeding 28 days as the engineer commissioner may think necessary.

Cement furnished by the contractor that has been tested and accepted by the Bureau of Standards and that is identified as such will be subject only to the following retests by the District of Columbia: Firmness, initial set, hard set, 24-hour tensile.

(*b*) *Sand.*—The sand used shall be clean, sharp river or pit sand, containing both fine and coarse grains, but free from sewage, mud, clay, mica, paper, leaves, chips, or other foreign matter, and not showing when shaken with water, and after subsidence more than 5 per cent by volume, of silt.

(*c*) *Broken stone.*—Stone used in concrete must be hard, durable, and properly broken to a size small enough to pass through a ring 2 inches in diameter when the run of the crusher is substituted for gravel. The run of the crusher shall not contain over 1 per cent of material passing a No. 10 sieve. The stone shall be thoroughly cleansed from all foreign substance, and shall be screened and washed, if so ordered by the engineer. Sand, detritus, or any material other than hard, angular fragments of stone will be considered foreign substances.

(*d*) *Gravel.*—Gravel shall be clean, washed gravel, and shall not contain pebbles greater than 2 inches in their largest dimensions, and shall run from that down to pea size, well graduated.

(*e*) *Water.*—Water used for mortar and concrete shall be fresh and clean, free from earth, dirt, or sewage, and shall be used in such quantity as the engineer may direct.

(*f*) *Platforms.*—Platforms shall be provided if so ordered by the engineer upon which all sand, gravel, and broken stone for concrete shall be placed when brought upon the line of work, and kept there until used.

(*g*) *Mixing.*—The thorough mixing and incorporation of all material will be insisted upon. If done by hand labor the dry cement and sand shall be turned over and mixed with shovels by skilled workmen not less than six times before the water is added; the stone or gravel, after being drenched with water, shall be added to the mixed sand and cement; the drenching shall not

be done while the stone or gravel is in the wheelbarrow; the whole mass shall be thoroughly turned over with shovels, not less than four times, and mixed upon a water-tight platform until every particle of stone or gravel is completely enveloped with mortar. The whole operation of mixing and laying each batch shall be performed as expeditiously as possible, by the aid of machinery, or a sufficient number of skilled men. If the concrete is mixed in batches requiring one barrel of cement, the platform must not be smaller than 10 feet by 12 feet, nor will a larger amount of concrete than can be made with one barrel of cement be allowed to be mixed in one batch by hand. In mixing by machinery the materials must be so delivered as to insure a uniform product of the specified proportions of all ingredients to the satisfactoin of the engineer.

(*h*) *Setting.*—Concrete shall not be used after it has begun to show evidence of setting. No concrete which has once set shall be used as material for mixing a new batch.

Each batch of concrete after being mixed shall be spread in place in horizontal layers by means of shovels so as to give the requisite thickness after being tamped, and shall then be thoroughly compacted. Any evidence of lack of compaction will be regarded as sufficient reasons for removal and replacement of the base. Hauling over base less than three days old will not be allowed unless planks are laid.

7. *Five-inch concrete base.*—All provisions of the specifications for a 6-inch concrete base shall apply to a 5-inch concrete base which shall differ from the 6-inch base only in respect to the thickness thereof and the price paid therefor.

SHEET-ASPHALT PAVEMENT.

8. *Asphalt binder.*—The binder course shall be composed of broken stone, equal in quality to the stone specified for concrete base, its largest dimension passing an inch-and-a-quarter screen, and the stone, after passing the heating drums, shall not contain less than 5 nor more than 15 per cent of material passing a No. 10 screen.

The stone will be heated not higher than 350° F., in suitable appliances. It is then to be thoroughly mixed by machinery with asphalt cement, such as is acceptable for surface cement, penetration 50 to 80, at such temperature and in such proportions that the resulting binder will have life and gloss without an excess of cement. Should it appear dull from overheating or lack of cement, it will be rejected. While hot it will be hauled upon the work, spread upon the base so that when compacted it will be at least 1½ inches in thickness, and immediately rammed and rolled until it is cold. Should the resulting course not show a proper bond, it must be immediately removed and replaced by and at the expense of the contractor. Binder and top shall not be taken from the yard to the site of the work, when in the judgment of the engineer weather conditions are unsuitable for the work of laying the pavement.

The contractor shall not enter upon a concrete base in order to lay the binder course until it has obtained sufficient strength for such a purpose, and during the period between laying the base and binder he shall properly protect it, and, when ordered by the engineer, shall sprinkle it in warm weather between the hours of sunrise and sunset as often as may be deemed necessary, and in cold weather cover it with a material suitable for its protection.

9. *Asphalt wearing surface.*—The wearing surface of the pavement shall be composed of asphalt cement (refined asphalt and asphaltic flux); clean, sharp-grained sand; fine absorbent mineral dust.

(*a*) *Asphalt.*—The asphalt shall be refined until homogeneous and free from water and shall not at any time be heated to a temperature high enough to injure it, and 100 parts of the refined product shall require not more than 30 parts of flux to produce the asphalt cement described in paragraph 9–c.

The asphalt for class (*a*) work shall conform to such tests as will establish its identity as a product of the refinement of a natural crude asphalt without the admixture of any other material.

The refined asphalt for class (*b*) work shall be the product of refinement of an unadulterated natural asphaltic oil, and shall contain, after refinement, not less than 90 per cent of bitumen soluble in carbon bisulphide.

(*b*) *Asphaltic flux.*—The flux used in the manufacture of asphalt cement shall be an asphalt oil from which the lighter oils have been removed by distillation without cracking, until the flux has the following characteristics: Free from water and foreign matter; flash point, not less than 300° F.; distillate at 400° for 18 hours, less than 10 per cent; the flash point shall be taken in New

York State closed oil tester. The distillate shall be made with about 50 grams of flux in a small glass retort provided with a thermometer, and placed in a copper holder. The residue in the retort, after distilling, must be free from coke. Any other softening agents approved by the engineer commissioner, may be used in place of asphaltic flux.

(*c*) *Asphalt cement.*—The asphalt cement must be of refined asphalt, fluxed when necessary with asphaltic oil, refined maltha, or other approved flux. The cement must be practically free from water and must be within the range of 40 to 70 penetration when tested at 77° F. on Dow penetration machine with No. 2 needle, 100 grams, 5 seconds. The degree of penetration to be fixed by the engineer commissioner.

Preference will be given to an asphalt cement that is not readily affected by water, provided it is satisfactory in other respects. The use of an asphalt under these specifications shall be subject to the approval of the engineer commissioner, and if an asphalt has been proposed for use by the contractor and approved by the engineer commissioner no change in the asphalt to be used shall be made unless with the approval of the engineer commissioner. If an asphalt or flux is submitted for use which has not been successfully used for a period of at least two years for paving under conditions similar to those existing in the District of Columbia, its use may be limited to such extent as may be deemed advisable, or it may be rejected for use entirely, in the discretion of the engineer commissioner.

The asphalt cement must comply with the following tests:

1. It must be of such consistency that when tested at 32° F. it will not show a hardness below 10 penetration, and when tested at 115° F. it will not be softer than 350 penetration.

2. When a briquet of the cement having a minimum cross section of one square centimeter, having a penetration of 50° to 53° at 77° F. is tested for ductility at 77° F., the bitumen must stretch at the rate 5 centimeters per minute to a distance of 25 centimeters before breaking.

3. When the cement is heated in an open tin box ¾ inch deep by 2½ inches in diameter at a temperature of 300° F. for seven hours in a hot-air oven, it must not show a loss by volatilization of over 5 per cent and must not have been hardened over 30 per cent by this heating.

The asphalt cement must never be heated to a temperature that will injure it. When the asphalt cement contains over 5 per cent of material that will separate by subsidence while in a molten condition, it must be thoroughly agitated before drawing from storage and while in use in the supply kettles, so as to insure a uniform cement.

These properties shall be determined by tests made by uniform methods, as adopted in the office of the engineer commissioner.

(*d*) *Sand.*—The sand to be used shall be free from mud, hard grained, and moderately sharp. On sifting, it should have at least 15 per cent of material that would be caught on a 40-mesh per inch screen, 25 per cent of material that will pass on 80-mesh to an inch screen, and 10 per cent at least must pass a 100-mesh to an inch screen. If the sand to be used does not contain the desired fine material, mineral dust may be added to make up the deficiency, and in any case at least 5 per cent of such mineral dust shall be used. The amount of fine material may be increased, at the discretion of the engineer commissioner.

(*e*) *Mineral dust.*—This shall be any fine Portland cement or limestone dust, the whole of which shall pass a 30-mesh screen and at least 85 per cent pass a 100-mesh screen.

(*f*) *Asphalt paving material.*—The materials complying with the above specications shall be mixed in proportion by weight depending upon their character and the traffic on the street, and upon the character of the asphalt, and will be determined by the engineer commissioner, but the percentage of bitumen in any mixture soluble in carbon bisulphide shall not be less than 9 nor more than 13 per cent. If the proportions of the mixture are varied in any manner from those specified the mixture will be condemned; its use will not be permitted; and, if already placed on the streets, it must be removed and replaced by proper materials at the expense of the contractor.

The sand or the mixture of sand and stone dust, and the asphalt cement, will be heated separately to about 300° F. The dust, if limestone, will be mixed while cold with the hot sand in the required proportions and then mixed with the asphalt cement at the required temperature, and in the proper proportion in a suitable apparatus, so as to effect a thoroughly homogeneous mixture. Sand boxes and asphalt gauges will be weighed in the presence of inspectors as often as may be desired.

Samples of all material entering into the composition of the pavement shall be supplied to the inspector of asphalt and cements when required, in suitable tin boxes and cans; he shall have access to all branches of the works at any time, and shall have the right to obtain samples of all materials from the source of supply.

(*g*) *Laying asphalt surface.*—The asphalt paving mixture, prepared in the manner described, will be hauled to the site of the work at a temperature of not less than 250° or more than 350° F. in trucks or wagons, canvas covers being provided for use in transit. It will then be shoveled into place and thoroughly spread to a thickness of at least 2½ inches by means of hot iron rakes, in such manner as to give uniform and regular grade, so that, after having received its ultimate compression, it will have a net thickness of at least 1½ inches. This depth will be constantly tested by means of gauges furnished by the engineer commissioner. The surface will then be compressed by steam rollers. First with a roller weighing not less than 2½ tons after which a small amount of hydraulic cement will be swept over it and will then be thoroughly compressed by a steam roller weighing not less than 10 tons, the rolling being continued for not less than five hours for every 1,000 yards of surface. The street to be barricaded, the barricades to remain for such length of time as deemed necessary by the engineer commissioner. Binder or topping shall not be laid when in the judgment of the engineer weather conditions are unsuitable for the work of laying the pavement. The surfaces on which they are laid must be cleaned to the satisfaction of the engineer so that good adhesion of the binder to the base and of top mixture to the binder may be secured.

10. *Laying vitrified blocks.*—Vitrified-block gutters will ordinarily be 13½ inches wide, laid on a concrete base 6 inches in depth, of the same material and proportions and laid in the same manner as prescribed in these specifications for the concrete base under asphalt pavements.

As soon as practicable after the concrete base has been laid, a dry mixture, composed of four parts of the sand specified in paragraph 6–*b*, and one part of Portland cement, thoroughly mixed, will be spread thereon to the depth of not less than one-half inch, as a bed for the paving blocks, and regulated so as to be exactly parallel to the finished grade of the gutter.

On the bed thus prepared for them the blocks will be set on edge, with the longest dimensions at right angles to the curb, or as directed by the engineer.

The longitudinal joints of each course of blocks laid must be broken by a lap of not less than 4 inches.

The blocks will then be carefully rammed by placing a plank over several courses and ramming the plank with a heavy rammer. The ramming will be continued until the blocks reach a firm, unyielding bed and present a uniform surface, with proper grade. Any lack of uniformity in the surface or defect in the grade must be corrected by taking up and relaying the blocks.

After proper ramming the entire gutter will be thoroughly grouted with a thin, easily flowing grout, of neat Portland cement.

A similar construction of block to that described for gutters may be used adjacent to railroad tracks; the base will in that case extend to the bottom of the crossties, or at least 6 inches thick.

The blocks will be furnished the contractor at the District property yards, and must be hauled to the work at his expense.

ASPHALT-BLOCK PAVEMENT.

11. *Asphalt blocks.*—The size of the blocks will be 2 by 5 by 12 inches, and a variation of ¼ inch from these dimensions will be sufficient ground for rejecting any block.

All bids must be accompanied by a specimen block of the size and quality described in these specifications, labeled with the name of the bidder and locality of the factory. Bids not accompanied by specimen blocks will not be accepted. The blocks will be tested for specific gravity which shall not be less than 2,400 and all blocks furnished must be equal in quality to the sample, as determined by the engineer commissioner.

The blocks to be composed of asphalt cement (refined asphalt and asphaltic flux); mineral dust; crushed stone.

(*a*) *Asphalt.*—The asphalt shall be refined until homogeneous and free from water and shall not at any time be heated to a temperature high enough to injure it. The refined product shall contain at least 50 per cent of bitumen soluble in carbon bisulphide and 100 parts shall not require more than 30 parts of the flux to produce the asphalt cement described in paragraph 9–*c*.

(*b*) *Asphaltic flux.*—The flux used in the manufacture of asphalt cement shall be an asphaltic oil from which the lighter oils have been removed by distillation without cracking, until the flux has the following characteristics: Free from water and foreign matter; flash point not less 300° F.; distillate at 400° for 18 hours, less than 10 per cent; the flash point shall be taken in a New York State closed oil tester. The distillate shall be made with about 50 grams of flux in a small glass retort, provided with a thermometer and placed in a copper holder. The residue in the retort, after distilling, must be free from coke. Any other softening agent approved by the engineer commissioner may be used in place of asphaltic flux.

(*c*) *Asphalt cement.*—The asphalt cement must be practically free from water and shall not at any time reach a temperature high enough to injure it.

If an asphalt is accepted that is readily affected by water some provision satisfactory to the engineer commissioner must be made to guard against the results of such action, and such work must be included in the price bid.

The asphalt cement must comply with the following requirements and must in any case be subject to the approval of the engineer commissioner.

1. For the purpose of testing the asphalt cement having a penetration of 20° to 23° at 77° F. on the Dow penetration machine with a No. 2 needle, 100 grams, 5 seconds, its composition shall be so regulated by the addition, if necessary, of standard fine mineral dust; it will contain 50 per cent of bitumen soluble in carbon bisulphide.

This cement shall be so tough at 32° F. that a prism 1 centimeter square by 8 centimeters long between supports will not break under impact at center with less than 15 centimeters drop of a 25 gram weight striking a vertical plunger having a horizontal face of 1 centimeter by 1 millimeter resting on the asphalt prism.

2. Degree of penetration of the asphalt cement to be fixed by the engineer commissioner.

3. When the cement is heated in an open tin box $\frac{3}{4}$ inch deep by $2\frac{1}{2}$ inches in diameter at a temperature of 300° F. for seven hours in a hot-air oven it must not show a loss by volatilization of over 5 per cent and it must not have been hardened over 30 per cent by this heating.

The asphalt cement must never be heated to a temperature that will injure it.

When the asphalt cement contains over 5 per cent of material that will separate by subsidence while in a molten condition it must be thoroughly agitated before drawing from storage and while in use in the supply kettles so as to insure a uniform cement.

These properties shall be determined by tests made by uniform methods, as adopted in the office of the engineer commissioner.

(*d*) *Mineral dust.*—This shall be any fine Portland cement or limestone dust, the whole of which shall pass a 30-mesh screen, and at least 85 per cent pass a 100-mesh screen.

(*e*) *Crushed stone.*—The crushed stone in use shall be from any tough, hard rock, and shall not contain any appreciable amount of soft ingredients, such as mica, soft sandstone or shale. On sifting not more than 3 per cent shall be retained on a 4-mesh per inch screen; at least 40 per cent must be retained on 20-mesh per inch screen, and at least 12 per cent must pass a 100-mesh per inch screen. If the stone does not contain the desired fine material, mineral dust may be added to make up the deficiency, and in any case at least 5 per cent of such mineral dust shall be used.

(*f*) *Manufacture.*—The materials complying with the above specifications shall be mixed in proportions by weight, depending upon their character, which will be determined by the engineer commissioner, but in any mixture the percentage of bitumen soluble in carbon bisulphide shall not exceed the limits, 6 to 9 per cent.

If the proportions of the mixture are varied in any manner from those prescribed, the blocks will not be accepted.

The stone and dust and the asphaltic cement must be mixed while hot, and the mixture must be compressed into blocks by methods meeting with the approval of the engineer commissioner.

Samples of all material entering into the composition of the block shall be furnished when required, in suitable tin boxes and cans, to the inspector of asphalt and cements, who shall have access to all branches of the works at all times.

Blocks are to be manufactured with a total minimum compression of not less than 360,000 pounds per block, press pressure, and shall have a specific gravity of not less than 2,400.

12. *Method of laying blocks on concrete base.*—The two-inch blocks are to be laid on this concrete base in a paving bed of one part Portland cement and four parts sand, at least one-half inch thick, and as much thicker as may be necessary, due to inequalities in surface of concrete base, so that the blocks when tamped in place, will be securely imbedded in this paving bed and wholly supported by it, and will present a uniform surface with close joints and proper grade and crown. The pavement will then be thoroughly grouted with a thin easily flowing grout of one part neat Portland cement and one part fine sand.

13. *Additional work.*—The following specifications will cover incidental work which may be required of the contractor:

(*a*) *Setting 6 by 20 inch granite and bluestone curb.*—This curb will be set in the following manner: A trench parallel to the curb line, having a depth of 24 inches below the top of the curb when set, and 20 inches wide, will be excavated to receive the curb and its gravel bed; the dimensions of the trench, in width, will be 14 inches from the curb line toward the building line of the street, and 6 inches from said curb line toward the center line of the street. In the trench thus prepared the curb will be set, and brought to line and grade, with plumb face. Spalls of stone, hard-burned brick or other acceptable substance prepared for the purpose, will be used to adjust the curb to grade and these spalls will be so placed and adjusted as to support the curbing permanently, and afford a firm and stable support for it, without the use of small chips and fragments, used as "shimming" pieces, to wedge the stone in place. After the curb has been properly placed, and adjusted to line and grade, the trench will be filled with gravel of approved quality, to within 8 inches of the top of the curb, the filling to be done in layers of not more than 3 inches in depth, and thoroughly compacted by a suitable ramming. Close contact joints and even surfaces must be made, and the lines and grades furnished strictly followed.

(*b*) *Setting 8 by 8 inch granite curb.*—This curb will be set in the following manner: A trench parallel to the curb line, having a depth of 15 inches below the top of the curb when set, and 18 inches wide, will be excavated to receive the concrete and the curb. The dimensions of the trench in width will be 14 inches from the curb line toward the building and 4 inches from the curb line toward the center line of the street. In this trench thus prepared a bed of concrete, composed of one part of Portland cement, four parts of clean concrete sand, and ten parts of screen pebbles, will be laid, filling the trench to a depth of 5 inches, the material to be mixed and laid under the same conditions as prescribed for laying cement concrete base for sheet asphalt pavements. On the base prepared and laid as above, the curb will be placed before the concrete has set, and adjusted to line and grade by setting it to a firm, unyielding bearing in a bed of freshly made concrete, by the use of heavy wooden mauls. The face of the curb must be plumb and true to line, and the top of it carefully set to grade with close and even compact joints. After the curb has been set to line and grade, the trench on the footwalk side will be immediately filled with concrete to within 5 inches of the top of the curb, which will be thoroughly rammed and compacted, after which it will immediately be covered with earth to prevent injury to it through too rapid evaporation, etc. In case vitrified block gutters are to be laid in front of the curb, any portion of the concrete base of the curb that would interfere with the laying of such gutters must be removed immediately after the curb is set.

(*c*) *Resetting 6 by 20 inch granite and bluestone curb.*—The work to be done under this classification is identical with that specified for setting this class of curb, except no hauling of curb is required other than that incidental to the necessary disposition of it upon the line of the work. Under this classification also, the curb may be adjusted to line and grade without removing it from its trench, if so ordered by the engineer.

(*d*) *Resetting 8 by 8 inch granite curb.*—The work to be done under this classification is identical with that specified for setting this class of curb, except that no hauling of the curb is required other than that incidental to the necessary disposition of it upon the line of work, and no new concrete is required other than that sufficient to imbed the stone and back and adjust it to line and grade.

(*e*) *General instructions.*—All curb will be furnished to the contractor at the District property yard and will be hauled by him to the site of the work; any curbing unaccounted for, or improperly disposed of, or damaged or broken, through careless or unskilled handling, will be charged against him, the value of the loss to the District will be deducted from any amount due the contractor for work done, as determined by the engineer.

All expenses connected with or incidental to the work of setting or resetting curb, as described above, including the hauling of the curbing, preparing the curb trenches, and the necessary grading connected therewith, furnishing gravel and spalls, furnishing and placing concrete, and all other material and labor necessary to execute the work in accordance with the specifications therefor, are included in the fixed price for the respective items as hereinafter stated. The cost of dressing, jointing, or cutting the curb will be paid for additionally, but no other claim for additional compensation will be entertained. Should the adjoining brick footwalks be disturbed in order to set or reset the curb the portion so disturbed shall be repaved, if required by the engineer, without cost to the District.

14. *Prices for additional work.*—Contractors must do such additional work incident to the construction of new pavements as may be ordered on each street by the engineering commissioner. All such work shall be in accordance with current District specifications. Prices paid for this work will be as stated below:

(1) Removing old curb, including haul not to exceed 2 miles, 12 cents per linear foot.
(2) Hauling same beyond distance of 2 miles, 1 cent per linear foot per mile.
(3) Hauling from District property yard and setting 6 by 20 inch curb, 25 cents per linear foot.
(4) Resetting 6 by 20 inch granite and bluestone curb, 25 cents per linear foot.
(5) Hauling from District property yard and setting 8 by 8 inch curb, 35 cents per linear foot.
(6) Resetting 8 by 8 inch curb on new concrete base, 31 cents per linear foot.
(7) Resetting 8 by 8 inch curb on old concrete base, 20 cents per linear foot.
(8) Dressing, jointing, and cutting curb, etc. (stonecutter's time), including setting-up labor, 75 cents per hour.
(9) Removing old rubble, cobble, flagging stone, and brick, vitrified block or brick, etc., including haul not to exceed 2 miles, 18 cents per square yard.
(10) Removing old asphalt blocks, including haul not to exceed 2 miles, 23 cents per square yard.
(11) Removing old granite block, including haul not to exceed 2 miles, and removal of old paving bed and cleaning concrete base where same exists, 30 cents per square yard.
(12) Overhaul on items 9, 10, and 11, 2 cents per square yard per quarter mile or fraction thereof.
(13) Removing old coal-tar or asphalt surface and binder from concrete base in connection with resurfacing work, including haul, 14 cents per square yard.
(14) Grading and hauling earth, not to exceed 1,000 feet, 65 cents per cubic yard.
(15) Grading and hauling macadam not to exceed 1,000 feet, 65 cents per cubic yard.
(16) Removing old coal-tar and bituminous pavements or base of the class laid since 1880 and hauling not to exceed 1,000 feet, $1 per cubic yard.
(17) Removing old coal-tar and bituminous pavement or base of the class laid prior to 1880 and hauling same not to exceed 1,000 feet, $1.85 per cubic yard.
(18) Removing old concrete base and hauling not to exceed 1,000 feet, $1.60 per cubic yard.
(19) Hauling excavated material, per 100 feet, over first 1,000 feet, 1¼ cents per cubic yard.
(20) Laying or relaying vitrified brick or block on old concrete base, 70 cents per square yard.
(21) Laying vitrified block on new concrete base in connection with asphalt block pavement, $1.40 per square yard.
(22) Laying or relaying asphalt block and vitrified brick or block on gravel base, 45 cents per square yard.
(23) Cleaning old vitrified brick or block for relaying, 25 cents per square yard.

(24) Laying and relaying granite block, 75 cents per square yard.
(25) Relaying cobble and rubble. 40 cents per square yard.
(26) Repairing cement walks, including haul, $1.50 per square yard.
(27) Repairing brick walks, 25 cents per square yard.
(28) Laying Portland cement concrete base in place, $5,40 per cubic yard.
(29) Adjusting manhole tops and basin covers to grade, $1.50 each.
(30) Adjusting water-valve casings to grade, $3 each.
(31) Asphaltic top, 47 cents per cubic foot.
(32) Asphaltic binder, 26 cents per cubic foot.
(33) Adjusting electric light or telephone manhole tops to grade, as follows:
(*a*) Size, less than 6 square feet area, $1 each.
(*b*) Size, over 6 and less than 16 square feet, $2 each.
(*c*) Size, from 16 to 28 square feet, $4 each.

15. *Extra work.*—The contractor must be prepared to do any extra work that may be ordered in writing by the engineer, and for this he will be paid at current rates for work of a similar character, or, if extra work should be of a class for which no rate is fixed by current contracts, the actual reasonable cost to the contractor, as determined by the engineer, plus 15 per cent of said cost.

The contractor shall have no claim for compensation for extra work unless same is ordered in writing by the engineer. All additional and extra work shall conform to current District of Columbia specifications therefor.

16. *Guarantee.*—All work under this contract will be guaranteed and kept in repair by the contractor without cost to the District of Columbia for a period of one year from date of its completion as indicated on the final voucher for each street.

It is further expressly understood and agreed that if any of the pavements laid should, for any reason whatsoever, within the period of one year, prove inferior to the best laid in the District prior to July 1, 1917, then the contractor shall, on demand of the commissioners, remove such defective pavements and relay them with new material of approved quality. The engineer commissioner shall decide the question of inferiority.

On expiration of guarantee for maintenance the work is to be inspected, and all imperfections must be corrected where and to such extent as the engineer shall direct, upon which the engineer will accept the same in writing, and until such acceptance the guarantee shall be in force. Repairs that may become necessary during the guarantee period will be made by the contractor when ordered by the engineer commissioner.

If the contractor fails to make such necessary repairs after notice to do so, the commissioners may cause such work to be done and the contractor and the surety or sureties under the bond shall be jointly and severally liable for the cost of same.

17. *Cuts.*—Contractors shall be responsible for any work done upon any street over plumbers' cuts or other work done by the permission of the commissioners before the work is begun.

18. *Modification.*—The commissioners reserve the right to modify these specifications as may from time to time seem desirable. The amount of compensation, if any, due the contractor for said modifications will be determined by the engineer commissioner on the same basis as in the case of extra work.

GENERAL STIPULATIONS.

These stipulations are part of the specifications.

1. *Bond.*—Good and sufficient bond in the penal sum equal to at least 25 per cent of the estimated amount of the contract, with sureties or a surety company satisfactory to the commissioners, will be required from all contractors, guaranteeing that their contract will be faithfully performed; that the contractor or contractors will be responsible for all claims for damages to persons, property, or premises arising out of his or their operations prior to the acceptance of the finished work, and that he or they will promptly make payments to all persons supplying him or them with labor and materials in the prosecution of the work provided for in the contract. In the event that the sureties or surety company become unsatisfactory to the said commissioners, they may, in their discretion, require from the contractor an additional or new bond, in the same or a lesser penal sum, with sureties or a surety company satisfactory to them and to be conditioned as above required.

Upon the failure to furnish such additional or new bond within 30 days after written notice to do so, all payments under this contract will be withheld until such additional or new bond is furnished.

2. *Transfers.*—No contract or any interest therein shall be transferred by the parties to whom the award is made; such transfers will be null and void, and will cause the contract to be annulled and the work to be given to other parties under the conditions mentioned herein.

3. *Patents.*—The District of Columbia assumes all responsibility under this specification and contract as to any claim which may be made that any process prescribed in these specifications is an infringement of any patent covering pavement construction and will defend and save harmless the contractor as to any such claim or the defense thereof in the courts: *Provided, however,* That the District of Columbia shall not be liable for claims for damages or anticipated profits preferred by the contractor on account of delay, interruption, or abandonment of the work occasioned by or resulting from such claim of infringement as is above referred to. The contractor, however, will be required to hold the District of Columbia harmless against all or any claims for the use of any patented article, appliance, or process in connection with the contract herein contemplated except as related above.

4. *Contractors' risk.*—All loss or damage due to negligence, or arising out of the nature of the work to be done, or from any unforeseen or unusual obstructions or difficulties which may be encountered in the prosecution of the same, or from the action of the elements, will be sustained by the contractor.

5. *Employees.*—The contractor shall employ capable superintendents or foremen to represent him on the work, and they shall receive and obey orders from the engineer. He shall so conduct his operations as to interfere with the work of other District contractors as little as possible. The foreman, mechanics, and others employed by the contractor shall be skilled in the several parts which are given them to do.

An employee or agent of the contractor who shall use profane or abusive language to the inspector, or otherwise impede or embarrass him in the performance of his duty, or who, in the opinion of the engineer, is careless or incompetent, or obstructs the progress of the work, or disobeys or evades the instructions given by the engineer, shall be immediately discharged and not again employed without the consent of the engineer.

6. *Weather.*—The contractor shall suspend all work under the contract when notified by the engineer that the weather is unsuitable for carrying it on.

If work is allowed during cold or freezing weather, the contractor shall take such additional precautions as the engineer shall require, without additional expense, and under no circumstances shall materials be used which have been injured by the weather.

7. *Inspection.*—Inspectors may be appointed who shall have access to all parts of the work at all times and whose duty it shall be to point out to the contractor any neglect or disregard of the specifications of the contract; but the right of final rejection of the work will not be waived at any time. Upon all technical questions concerning the execution of the work, in accordance with the specifications and the measurements thereof, the decision of the engineer shall be final. Ordinarily, one inspector will be employed by the District of Columbia for each section of the work under contract; but if, on account of any apparent disregard of the specifications, additional inspectors shall be required, they will be employed by the District of Columbia, at the rate not to exceed $6 per diem each, and the cost of same will be charged to the contractor.

8. *Condemned work.*—All materials furnished and work done not in accordance with these specifications shall be removed within 24 hours after written notice from the engineer, by and at the expense of the contractor, or, in case of failure to do so, it shall be removed by the District of Columbia and the cost thereof charged to the contractor and deducted from the amount due or which may become due him. None but the best material of the several descriptions shall be used.

9. *District material.*—No materials furnished by the District shall be applied to any other use, public or private, than that for which they are issued to the contractor. The contractor will be held responsible for all materials delivered to him upon requisition, and shall be charged for all materials delivered upon said requisition. Should the amount of materials actually delivered and not properly accounted for exceed the amount used upon the work, the cost to the District of the difference must be made good by the contractor, and will be deducted from any moneys which may be due him.

Any material that is the property of the District that is not accounted for by the contractor to the satisfaction of the engineer will be charged against the contractor at the contract price for similar material.

10. *Failure.*—If the contractor shall delay or fail to commence with the delivery of the material or the performance of the work as specified herein, or shall, in the judgment of the commissioners of the District of Columbia, fail to prosecute faithfully and diligently the work in accordance with the specifications and requirements of this contract, then, in either case, the said commissioners shall have the power to annul this contract by giving notice in writing to that effect to the contractor, and, upon the giving of such notice all payments to the contractor under this contract shall cease, and all money or reserved percentage due or to become due thereunder shall be retaind by the said commissioners until the final completion and acceptance of the work herein stipulated to be done; and the said commissioners shall have the right to recover from the contractor whatever sums may be expended by the District of Columbia in completing the said contract in excess of the price herein stipulated to be paid the contractor for completing the same, and also all costs of inspection and superintendence, including all necessary traveling expenses connected therewith, incurred by the said District of Columbia, in excess of those payable by the said District of Columbia during the period herein allowed for the completion of the contract by the contractor, and the said commissioners may deduct all the above-mentioned sums out of or from the money or reserved percentage retained as aforesaid; and upon the giving of the said notice the said commissioners shall be authorized to proceed to secure the performance of the work or delivery of the materials, by contract or otherwise, in accordance with law.

11. *Payments.*—Payments will be made monthly, *provided the progress of the work is satisfactory,* less 10 per cent of each estimate, to be withheld until final payment.

12. *Conveniences.*—The contractor shall provide, for use of the District inspectors, stationed at paving plant, and cement warehouse, suitable office and testing room with such plain furniture as may be necessary for the proper transaction of their business as agents for the District. They shall also furnish, when needed for use of laborers on line of work, necessary toilet conveniences secluded from public observation.

13. *Cleaning up.*—On the completion of work it shall be thoroughly cleaned before it will be accepted.

14. *Lines.*—All necessary lines and levels will be given by the engineer by means of suitable marks, and in establishing them the contractor shall provide such materials and assistance as may be required by the engineer. All marks given are to be carefully preserved and if destroyed through carelessness the cost of replacing them shall be charged against the contractor at a fixed price of $2 for each point, to be deducted from any money found due at final settlement.

15. *Interpretation.*—Any doubt as to the meaning of these specifications will be explained by the engineer, who shall have the right to correct any errors or omissions in them when such correction is necessary for the proper fulfillment of their intention. Whenever the word "commissioners" is used in these specifications, it is understood to designate the Commissioners of the District of Columbia. Whenever the word "engineer" is used, it is understood to designate the engineer commissioner of the District of Columbia, or, in his absence, his duly authorized assistants, assistant engineers, and inspectors representing him, limited by the special duties intrusted to them.

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